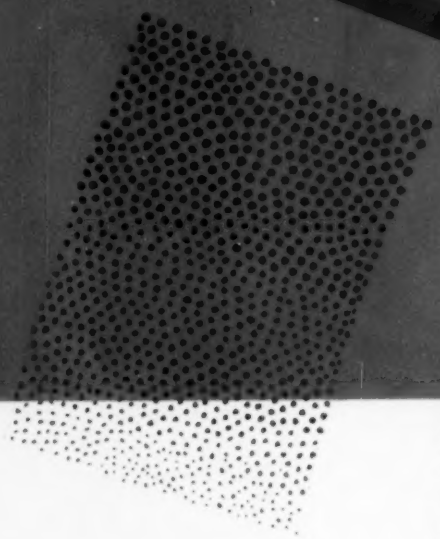
RUBBER and PLASTICS WEEKLY

VOLUME 140 NO. 23 JUNE 10 1961 ONE SHILLING

This is your S·P·A·C·E
ISR's new Technical Service Laboratory
The International Synthetic Rubber Company Limited · Southampton · Telephone: Blackfield 3141 · Telex: 47627 · Cables: INTOL HYTHE

Tyre Tread Crumb

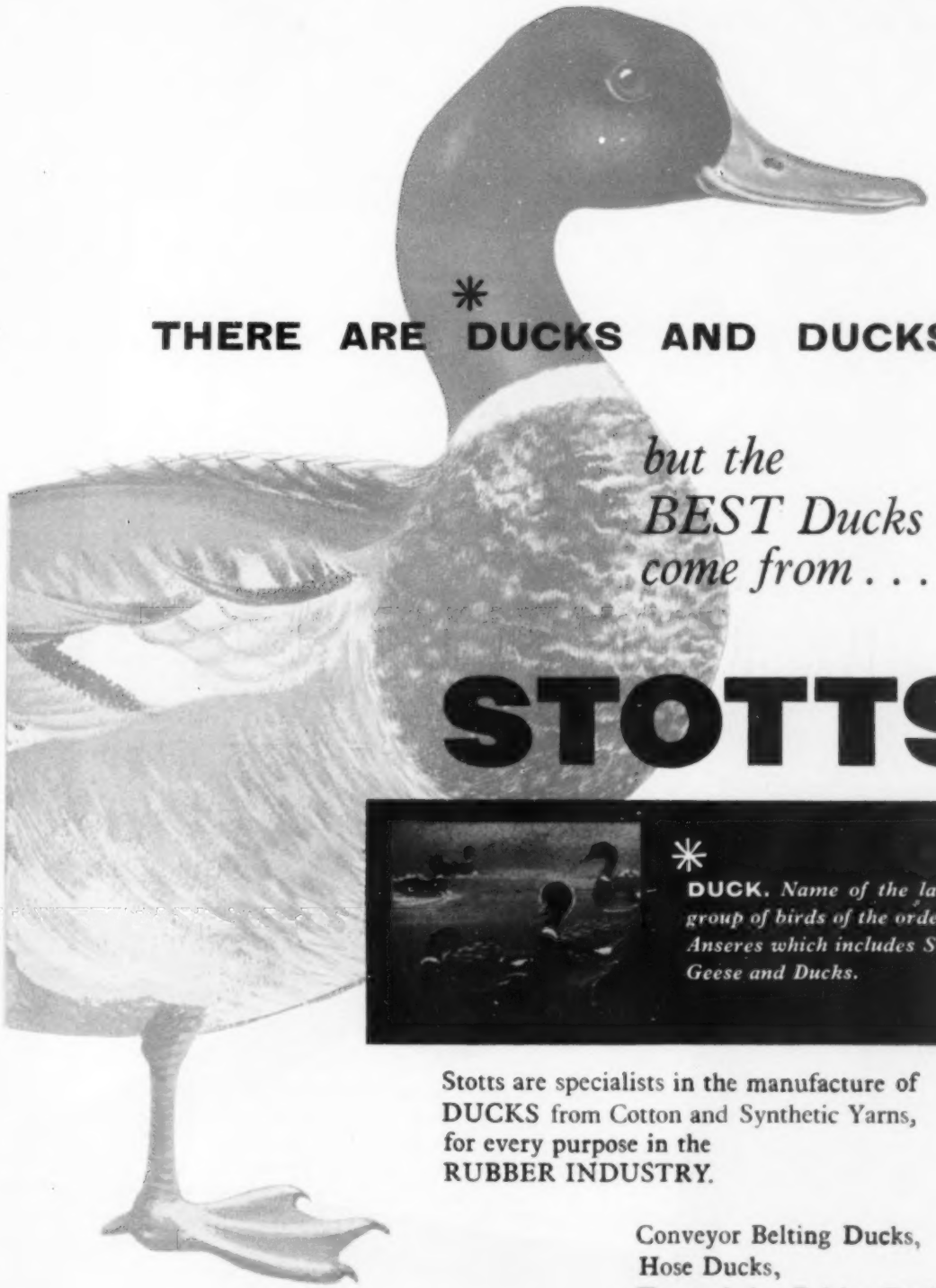
of consistent quality!



16's, 20's, 30's and 40's mesh

THE RUBBER REGENERATING COMPANY LTD

TRAFFORD PARK · MANCHESTER 17 · Phone: TRAfford Park 1424 · Grams: "Regenerate"



THERE ARE * DUCKS AND DUCKS

but the BEST Ducks come from . . .

STOTTS

* **DUCK.** *Name of the largest group of birds of the order Anseres which includes Swans, Geese and Ducks.*

Stotts are specialists in the manufacture of DUCKS from Cotton and Synthetic Yarns, for every purpose in the RUBBER INDUSTRY.

Conveyor Belting Ducks,
Hose Ducks,
Transmission Belting Ducks,
Chafer Ducks,
Packing Ducks,

JAMES STOTT LTD.

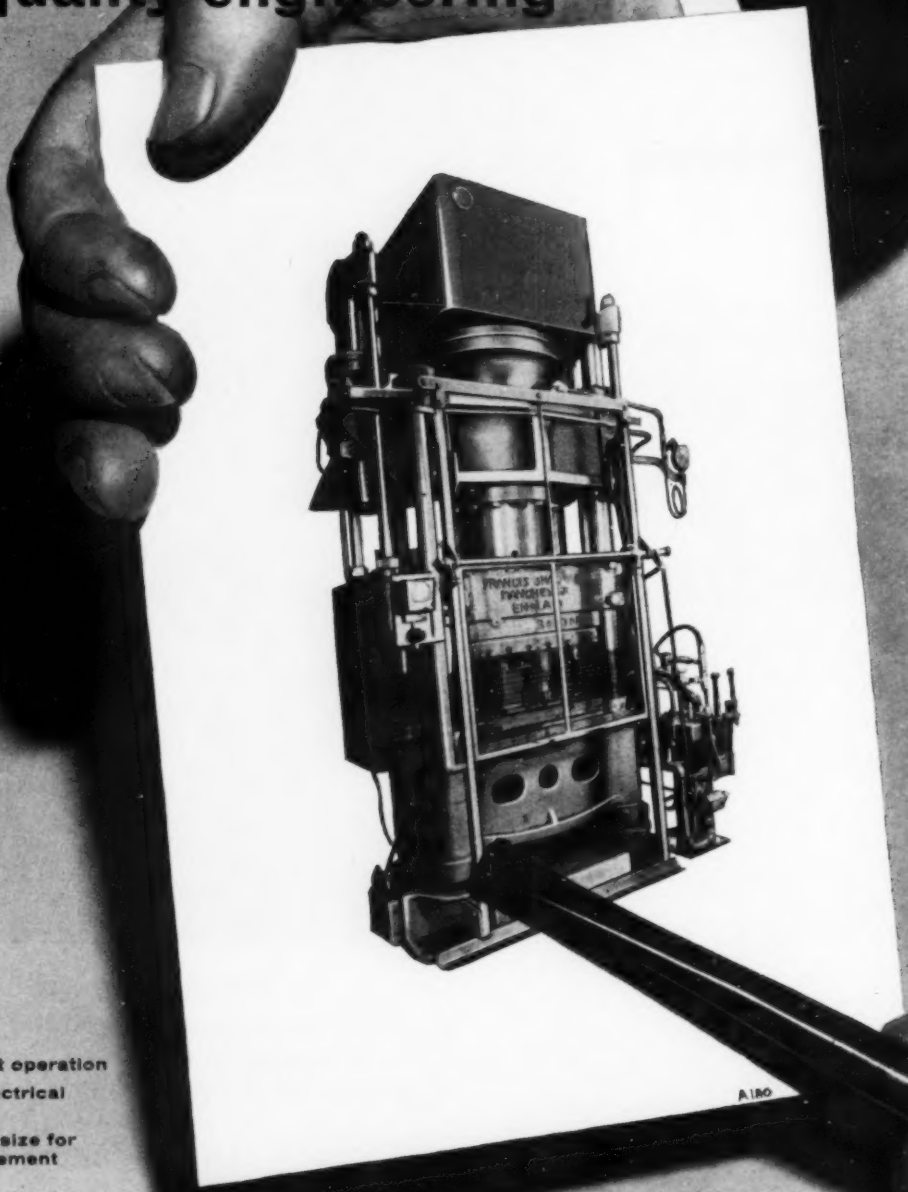
P.O. BOX 33. ROCHDALE.

Phone: ROCHDALE 49611 (3 lines) Grams: "DOUBLER" ROCHDALE

behind every **Francis Shaw** machine

research·design· quality engineering

Constant research and development, close co-operation with users, advanced design, selected high quality materials . . . These, coupled with long experience, help to create processing machinery of unrivalled performance.



Francis Shaw hydraulic presses are tailor-made to requirements of the rubber and plastics industries. Illustrated is a 300-ton press recently installed. Shaw presses include the following design features:

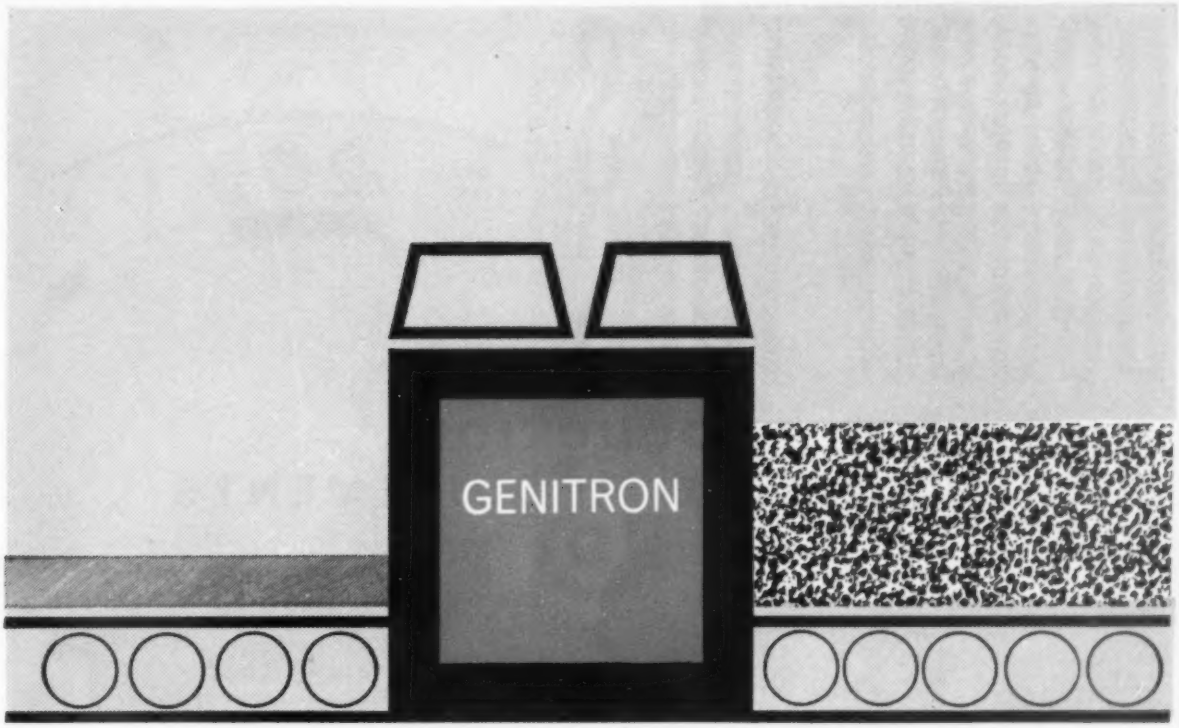
* Mains or unit operation
* Steam or electrical heating
* Appropriate size for every requirement

Francis Shaw

FRANCIS SHAW & COMPANY LIMITED · MANCHESTER 11 · ENGLAND
TELEGRAMS: "CALENDER" MANCHESTER · TELEPHONE: EAST 1313-8 · TELEX: 66-357
London Office: 22 Great Smith Street London SW1 · Telephone: Abbey 3245 · Telegrams: Vibrate London · Telex: 22250
Canada: Francis Shaw (Canada) Ltd Grahams Lane Burlington Ontario · Telephone: Nelson 4-2350 · Telegrams: Calender Burlington Ontario
Telex: Canada Calender Hamilton 921/982

OVERSEAS AGENTS THROUGHOUT THE WORLD

P4451



FREE BLOWING

cheaply * quickly * evenly

A very powerful, yet gentle blowing agent —that's GENITRON AC. It will readily expand a quite viscous mixture spread on a metal plate, PVC sheet or fabric backing, heated statically or on a moving belt.

GENITRON AC liberates 438 mls of gas per gram at 209°C —and because the gas evolution is so gentle the result is an even, finely celled structure that can have a density as low as 10 lbs. per cubic foot, if so required.

For work at lower temperatures, GENITRON AC will decompose, with suitable 'kickers', even as low as 140°C.

GENITRON AC is simply the best way of achieving the most satisfactory free blown PVC for a wide range of uses, from underlays for carpets to artificial suedes, from raised pattern wallpapers to upholstery for cars.

For further information and sample quantities just write to Whiffens.

WHIFFENS chemicals for industry

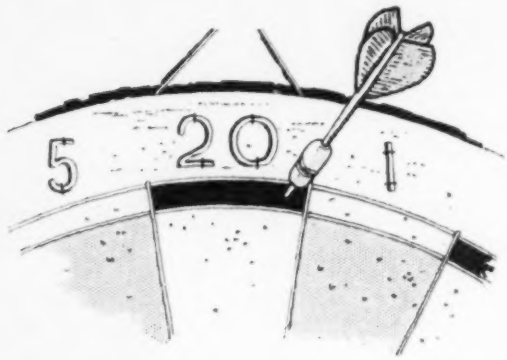
A member of the Fisons Group of Companies

Visit Stand BB525 International Plastics Fair, Olympia

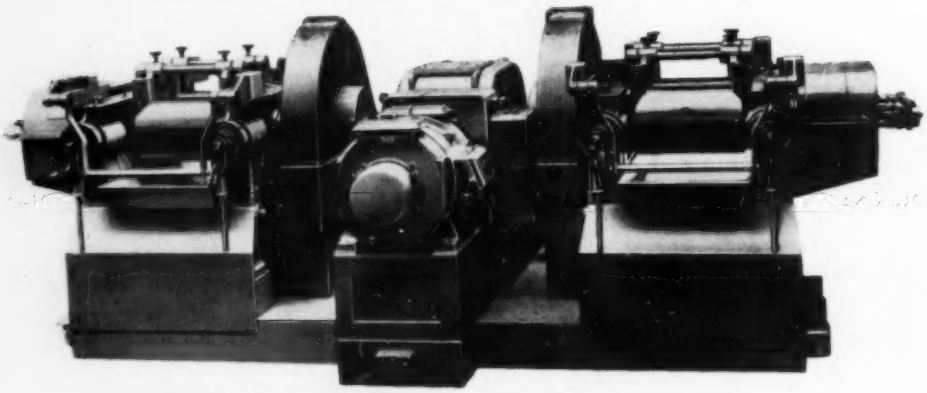
Whiffen & Sons Ltd.
Willows Works • Derby Road • Loughborough • Leicestershire
Telephone: Loughborough 3141 Telegrams: Whiffen, Loughborough, Telex No. 34548
Distribution outside the United Kingdom through Fisons Chemicals Overseas Ltd., Fisons House, Wigmore Street, London, W.1

W77

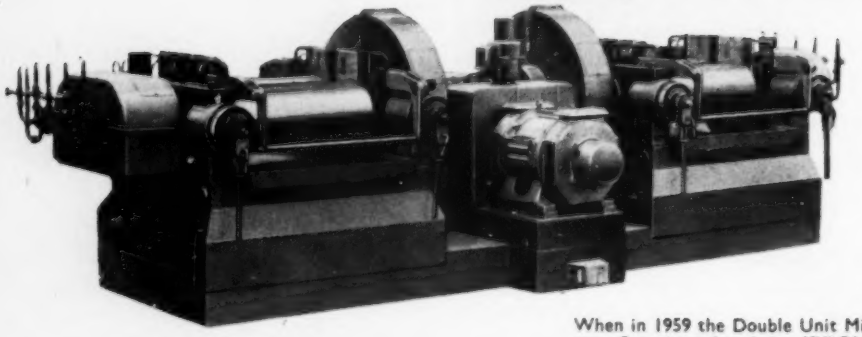
DOUBLE TOPS
DOUBLE TOPS



INCREASED PRODUCTION– REDUCED SPACE REQUIREMENTS



C.E.12 Double Unit Mixing Mills with central drive mounted on steel sub-frame, fitted with vibro insulators. Rolls 16" dia.



C.E.11 Double Unit Mixing Mills with central drive mounted on steel sub-frame, fitted with vibro insulators. Rolls 18" dia.

It's no longer **BIG NEWS** but **STANDARD PRODUCTION!**

When in 1959 the Double Unit Mill, mounted on vibro insulators, was first introduced by IDDON Bros., it created widespread interest throughout the industry.

This layout has now become an accepted standard of modern factory planning.

The consultation service of our technical staff is freely available.

IDDON BROTHERS LIMITED

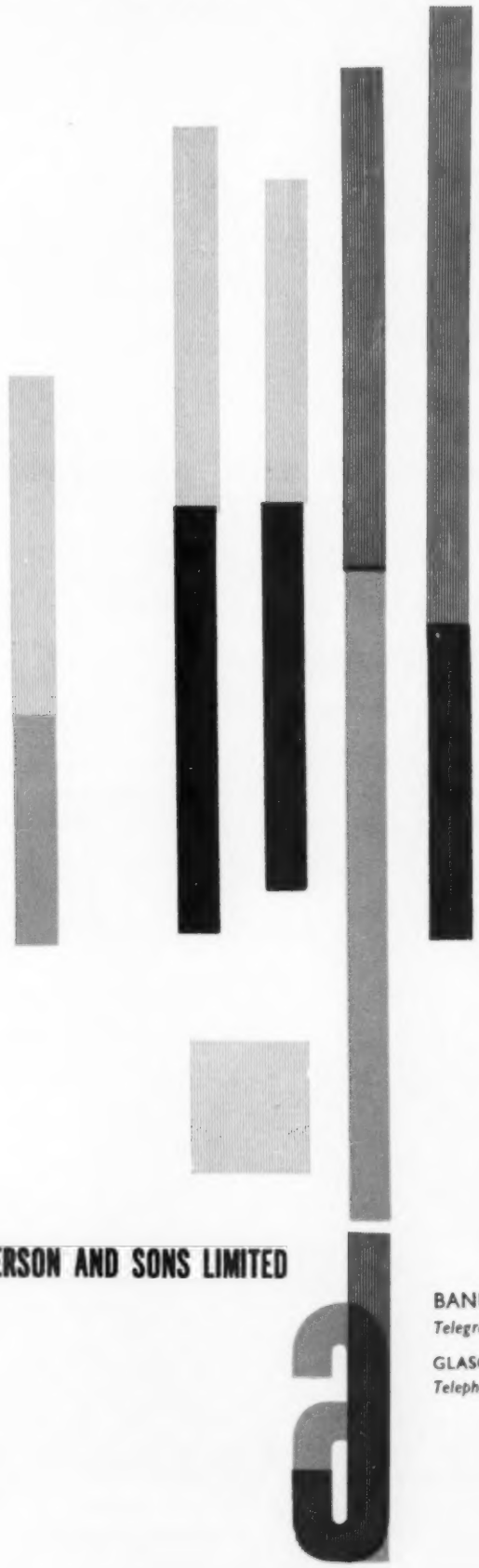
LEYLAND • LANCASHIRE

Telephone: LEYLAND 21258 *Telegrams: IDDON, LEYLAND*

LONDON Representative: Mr. J. Summers, Room 16, 4th floor, Abford House, Victoria, London, S.W.1. • Tel.: VICtoria 1488

U.S and CANADIAN Technical Sales and Service:
THE JOHN WILLIAMS MACHINERY LTD.
1868, Mattawa, Summerville (Toronto), Ontario, Canada
Telephone: Atwater 9-3741. Cables: Machinery, Toronto

MANUFACTURERS OF MIXING MILLS, PRESSES, CALENDERS, AND AN EXTENSIVE RANGE OF MACHINES FOR RUBBER AND PLASTICS INDUSTRIES



rubber reclaims

As a member of the B.R.R. group of companies our technical service is unsurpassed. We welcome enquiries concerning:

TYRE RECLAIM
RED TUBE RECLAIM
BLACK TUBE RECLAIM
DRAB RECLAIMS
MECHANICAL RECLAIM
RESIN RUBBER RECLAIM

JOSEPH ANDERSON AND SONS LIMITED

BANK STREET CLAYTON MANCHESTER 11
Telegrams : Sulphuring Manchester Telephone : East 0865

GLASGOW OFFICE 178 FULTON STREET GLASGOW W.3
Telephone : Scotstoun 2660 & 2661 Telegrams : Jogardi Glasgow

factice

for

NATURAL AND SYNTHETIC RUBBERS

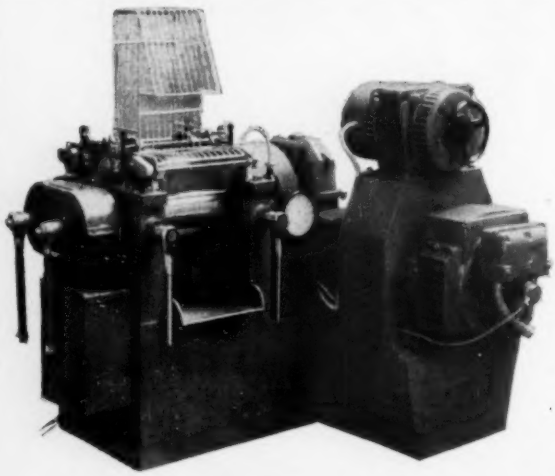
WHITE
GOLDEN
DARK

chemicals for rubber and plastics

J. ALLCOCK & SONS LTD

WEST GORTON, MANCHESTER 12

Telephone: EAST 0173 · Telegrams: Rubbasub M/c 12



VARIABLE SPEED

Full Specification on request

JAMES H. PULLEN (1942) LTD.

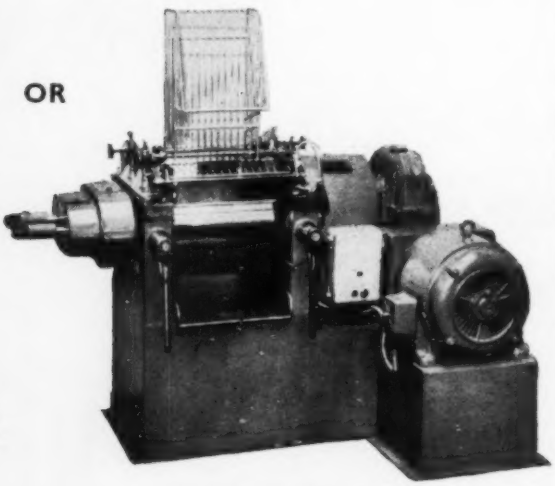
ROTHERMERE ROAD, WADDON, SURREY.

CROydon 6067/8

RUBBER & PLASTICS LABORATORY MILLS

In regular production for prompt or early delivery

OR



SINGLE SPEED

In the research laboratories of industry, chemists continue the search for new formulæ and new compounds to resolve their manufacturing problems.

tomorrow's products . . . in today's test tubes

In various fields, and in liaison with industry, the Research Division of The Washington Chemical Company Ltd. is making significant advances in the production of new grades of magnesium chemicals for particular applications.

By drawing on the Company's century of experience, chemists are able to specify special grades of Pattinson's (Regd. Brand) magnesium carbonates and oxides—confident that all deliveries will maintain the same high standards of quality. From the laboratory through to production, Washington chemicals may be depended upon for absolute consistency.

THE WASHINGTON CHEMICAL CO. LTD.

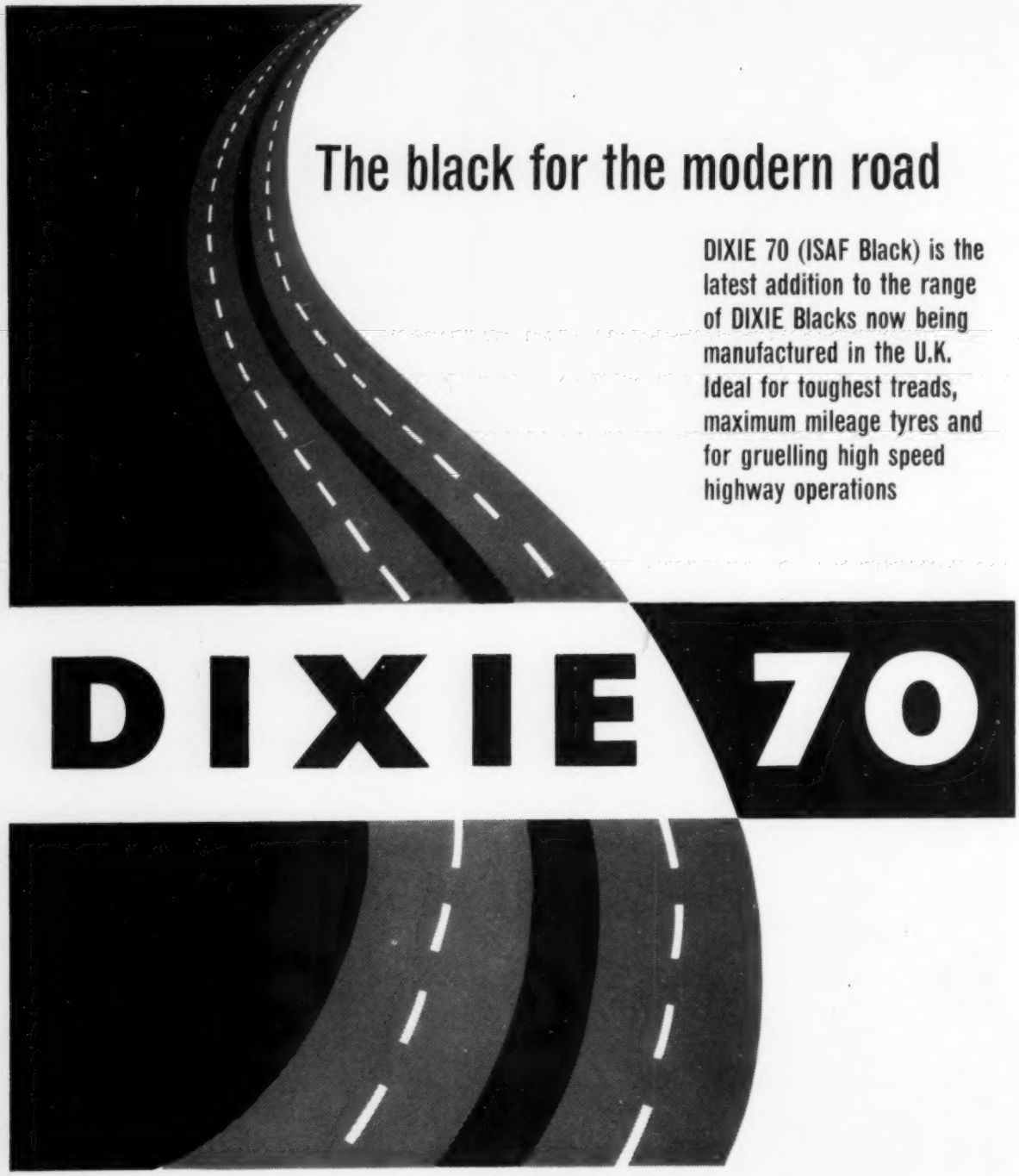
A member of the TURNER & NEWALL ORGANISATION WASHINGTON, COUNTY DURHAM, ENGLAND

Telephone: Washington 3333 Telegrams: Chemical, Washington Station, County Durham

LONDON: Empire House, St. Martin's le Grand, London, E.C.1 Telephone: MONarch 6898
MANCHESTER: 220/222 Corn Exchange Buildings, Cathedral Street, Manchester, 4. Telephone: BLAckfriars 4401

Agents throughout the world

WC/2/R



The black for the modern road

DIXIE 70 (ISAF Black) is the latest addition to the range of DIXIE Blacks now being manufactured in the U.K. Ideal for toughest treads, maximum mileage tyres and for gruelling high speed highway operations

DIXIE 70

ANCHOR CHEMICAL COMPANY LTD — MANCHESTER 11

London Office : Grand Buildings, Trafalgar Square, W.C.2
Scottish Agents : J. & G. Hardie & Co. Ltd., 178 Fulton Street, Glasgow, W.3
American Liaison and Service Branch : British Anchor Chemical Corporation, 366 Madison Avenue, New York 17, N.Y.

Editorial Director: J. D. COPEMAN.

News Editor: PETER RANSLEY.

Technical Editor:
RICHARD NYE, M.A.

Advertisement Director:
EDWARD J. BYFIELD.

Advertisement Manager:
MICHAEL J. WHELAN.

UK Area Representatives

L. Quy, South and West of England and South Wales (Operating from London Office)

A. J. Legg, Area Manager, 55 Lee Lane West, Horsforth, Nr. Leeds. Tel. No. Horsforth 3845. North - East England, Lancashire, Yorkshire and Lincolnshire

E. R. Leaver, Group Advertising Manager, Scotland (Operating from London Office

W. Brown, Area Manager, 13 Allerton Road, Southport, Lancashire. Tel. No. Southport 5121. Cheshire, Cumberland, Westmorland

E. Burgess, 40 Parkside Drive, Maybank, Newcastle-under-Lyme. Tel. No. 64678, Staffordshire North of the A.5

Overseas Representatives

Belgium—Albert Milhado & Co., G.m.b.H., Pompstraat 2, Antwerp

Germany—Albert Milhado & Co., G.m.b.H., Charlottenstrasse 32, Dusseldorf. Tel. No. 27217

Italy—Massimo Fano, Via V. Monti 14, Milan. Tel. No. Milan 808135

Netherlands—G. Arnold Teesing, Rubensstraat 68, Amsterdam, Z. Tel. No. 727913

United States—Overseas Publishers' Representatives, 29 West 34th Street, New York 1, N.Y. Tel. No. Bryant 9-0794

RUBBER and PLASTICS WEEKLY

Formerly 'Rubber Journal and International Plastics'

Volume 140 *IN ITS 77th YEAR* **No. 23**

June 10 1961

Editorial

NOTES OF THE WEEK 861

Articles and News

NEWS BRIEFS 862
TWO UK PLANTS FOR NYLON 6 863
IRI FOUNDATION LECTURE 1961 864
BIRMINGHAM'S CONNEXION WITH RUBBER 870
FROM START TO FINISH 872
DUNLOP COMPANY MEETING 882

Features

VIEWS AND REVIEWS 876
MEN AND MATTERS 878
THE LEGAL ANGLE 880
PLANTATION NEWSLETTER 884
RUBBER STATISTICS 884
RUBBER AND PLASTICS STOCK MARKET 885
RUBBER MARKETS 887
INDUSTRY INTELLIGENCE 889
MATERIAL PRICES 890

Classified Advertisements ... 891 Advertisers Index ... 894

MACLAREN HOUSE, 131 GREAT SUFFOLK STREET, LONDON, S.E.1
Grams: 'Buns, Souphone, London' Phone: HOP 5712
Annual Subscription, including Postage: United Kingdom and Oversea, £2 15s.: Index (half-yearly), 10s. per annum extra. Published weekly. Registered at GPO as a Newspaper. Registered for Transmission by Canadian Magazine Post. Entered as Second Class matter at Post Office, Boston, Mass. USA, under the Act of March 3; 1879 (Sec. 397 P. L. and R.)

ALL SIZES CONSTANT OR VARIABLE PITCH
SCREWS, BARRELS and LINERS for PLASTIC EXTRUDERS

Also manufacturers of
SPIRAL MARKING MACHINES
FOR PLASTIC CABLE IDENTIFICATION

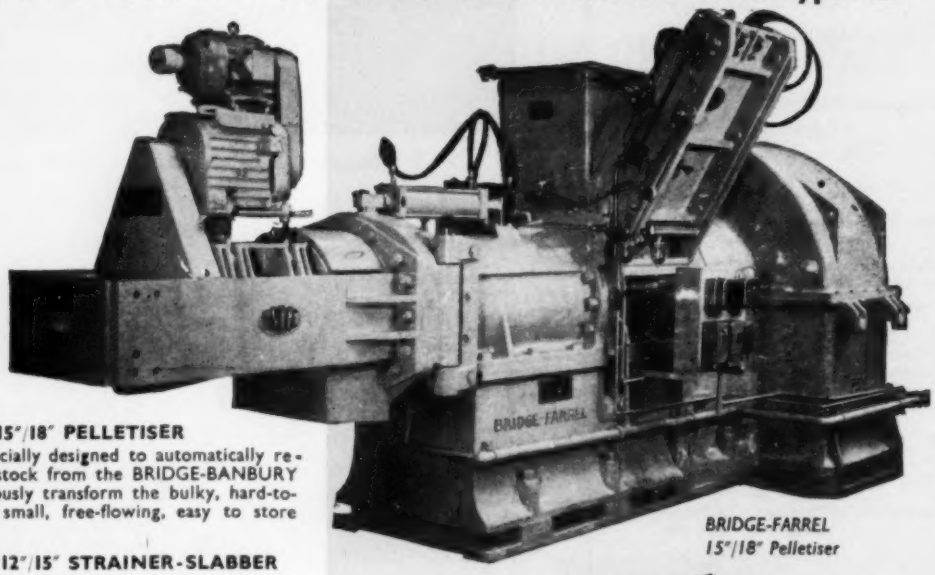
BUNCHING and TWINNING MACHINES
UP TO 24" DIAMETER BOBBINS

PAPER LAPPING MACHINES, STRANDING MACHINES
PAY OFF and TAKE UP STANDS, ETC.

JOHN DOCKER & CO. (ENGINEERS) LTD.
Cromwell Works, North Feltham Trading Estate, Feltham, Middlesex
Tel: Feltham 6341 Grams: Docrebuilt, Feltham Cables: Docrebuilt, London

There is a **BRIDGE FARREL** 'capacity matched'

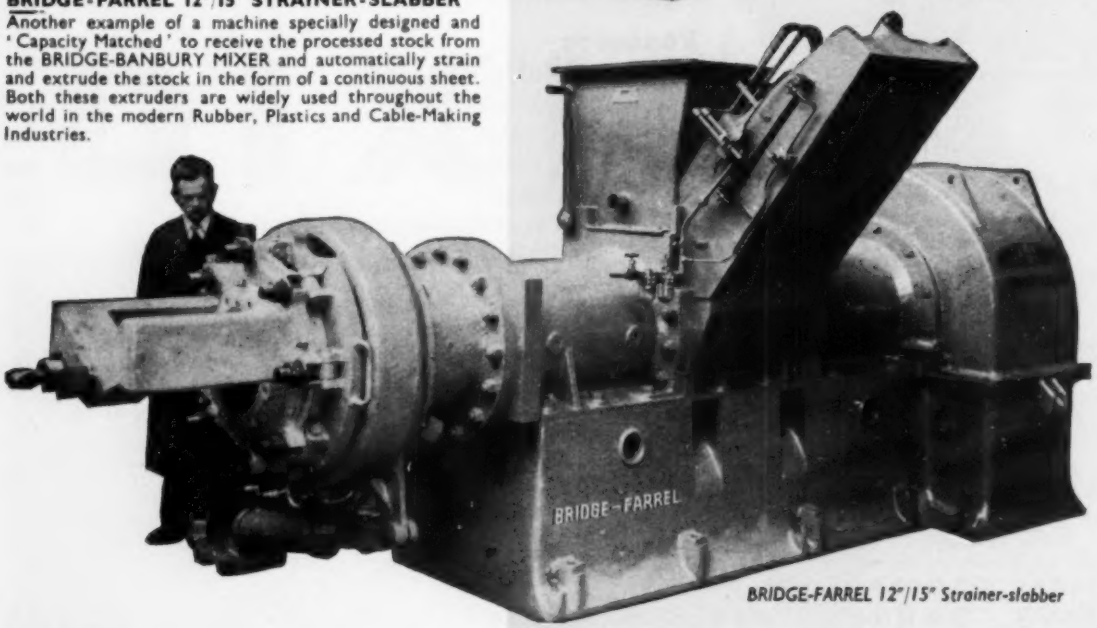
EXTRUDER for all sizes of BRIDGE-BANBURY MIXER on all types of process . . .



BRIDGE-FARREL 15"/18" Pelletiser

BRIDGE-FARREL 15"/18" PELLETISER
This extruder is specially designed to automatically receive the processed stock from the BRIDGE-BANBURY MIXER and continuously transform the bulky, hard-to-handle masses into small, free-flowing, easy to store pellets.

BRIDGE-FARREL 12"/15" STRAINER-SLABBER
Another example of a machine specially designed and 'Capacity Matched' to receive the processed stock from the BRIDGE-BANBURY MIXER and automatically strain and extrude the stock in the form of a continuous sheet. Both these extruders are widely used throughout the world in the modern Rubber, Plastics and Cable-Making Industries.



BRIDGE-FARREL 12"/15" Strainer-slabber

BRIDGE FARREL **"matched capacity" units are world acclaimed as the ultimate in continuous, high-production automated processes**

DAVID BRIDGE & COMPANY LTD. CASTLETON, ROCHDALE, LANCASHIRE

Telephone: Castleton Rochdale 57216 · Telegrams: Coupling Phone Castleton, Lancs.

London Office: Broughton House, 6, 7, 8, Sackville Street, Piccadilly, W.1
Telephone: Regent 7480 · Telegrams and Cables: Ederaceo, Piccy, London

Technically associated with the FARREL-BIRMINGHAM CO. INC., U.S.A. for over 40 years on the BANBURY MIXER and special machines

NOTES of the WEEK

Piping Standard

VARIOUS difficulties stand in the way of plastics pipe manufacturers in their fight to break into the building field. These include the necessity for builders and plumbers to learn entirely new jointing techniques, and the reluctance of the building trade in general to accept any structural material which has not been proved to have a useful service life for several decades. Architects and builders have a point when they complain that insufficient data is supplied, but this is becoming less and less valid; much technical literature published by plastics pipe firms recently is of excellent quality.

Preparing the information is one thing however; seeing that it is brought home to the customer quite another. So far as pvc is concerned, for example, many architects and builders seem to be thinking in terms of the material as it was ten years ago, and are unaware of the improvements in impact strength that have been obtained in new formulations for unplasticized pvc pipe, and in the SBR modified high impact grades.

The number of companies extruding plastics piping is on the increase; some of the latest to enter the field are A.B. Plastics Ltd., Allied Structural Plastics Ltd., and a consortium of three companies — Yorkshire Imperial Metals Ltd., Redland Tiles Ltd. and P. H. Muntz and Barwell Ltd. Allied Structural is the firm formed jointly last year by Universal Asbestos Manufacturing Ltd. and Thermo Plastics Ltd. for the sole purpose of producing plastics for the building field. It is an interesting commentary on the comparative acceptance that pipes, compared with some other applications, have had in the building field, that this company has chosen pipes and fittings for its first range of products, which was announced last week.

The paucity of standards is a point that often comes up when architects are asked to consider specifying plastics. Therefore the publication of a new British Standard (BS 3284) for polythene pipe for cold water services is an event of the first importance for plastics pipe manufacturers. A grey-backed, slim little booklet of sixteen pages or so is a small physical indication of the immense amount of work — and waiting — that goes into the production of a standard, as anyone who has had any dealings with this type of work knows only too well. This particular standard is the result of a great deal of effort by the general extrusions technical committee of the British Plastics Federation, which was largely responsible for its preparation. It is certain to play a useful part in attempts to gain the acceptance of plastics piping by local authorities and other bodies, which would open up the way to its widespread use.

NCL Work on Polymers

'INASMUCH as the chemical industry of the country continues to expand, the need for research in the chemical fields by the Government will inevitably grow', says the Steering Committee of the National Chemical Laboratory of the Department of Scientific and Industrial Research in its annual report, published this week.* The committee therefore recommends to the Council for Scientific and Industrial Research that the staff of the laboratory should be increased by roughly one-half in the next five to seven years, and doubled in the next 10-15 years.

People concerned with polymer research will raise no objection to this when they read the report, which contains some very interesting work in this field. Most of the organic chemical work at the laboratory is concerned with developing new polymers—particularly polymers with greater thermal stability than that associated with a carbon-carbon backbone. Work has been concentrated on organometallic polymers, with particular emphasis on boron-nitrogen compounds. The object has been to prepare linear polyborazynes $[RB{=}NR']_n$, and in the course of experimental work new organoboron compounds have been discovered. These compounds are of considerable scientific interest and have many unusual properties which seem certain to lead to commercial applications eventually. In fact, the report already suggests that one series of compounds synthesized show considerable promise as pre-ignition suppressors.

Mice and Gazelles

WE are pleased to see that Albright and Wilson, a company which now has considerable rubber and plastics interests, has won one of this year's *Accountant* awards for the good presentation of its company reports and accounts. In the last year or two there has been an improvement in company reports; but there are still many companies who fall behind. As Kenneth Mackinnon QC, the chairman of the panel who judged the entries, said at the presentation: 'In a financial world where animals such as "bears", and "bulls", and even "stags" at bay are commonplace it might not be inappropriate to say of some companies that they are as timorous as mice or as shy as gazelles in setting the picture before their shareholders'.

*Report of the National Chemical Laboratory 1960. Published for DSIR by HMSO, 4s. 6d.

NEWS *Briefs*

GRACE TO MARKET POLYPROPYLENE—LIBERIAN RETREAD PLANT—GOODRICH AKRON EXPANSION AUSTRALIAN PLASTICS DUTY—MOSCOW ORDER

●**United States** — The polymer chemicals division of W. R. Grace and Co. is to market polypropylene under a new agreement between Grace and Montecatini. The polypropylene will be produced in a new plant being built and to be operated at Neal, West Virginia, by Novamont Corporation, Montecatini's wholly-owned subsidiary, which is also represented in USA by Chemore Corporation. The Novamont plant will have an initial capacity of 25m. lb. and will go on stream in the third quarter of this year. Grace will market polypropylene under Montecatini's trade mark Moplen.

●**Liberia** — The Liberian Embassy has announced that next month 'the first lb. of Liberian rubber, after export of millions of tons over the past 30 years, will receive secondary processing within the country and a consumer product turned out'. The product will be a re-treaded tyre. The producer is US Trading Co., affiliate of Firestone Plantations Inc., which has been responsible for most of the country's raw rubber production. A £350,000 warehouse and factory installation is now going up in Monrovia's free port area, machinery for which is being imported from USA. The level of production will depend on how many tyre carcasses are available for retreading. As a free port operation, the plant will be able to import worn tyres from anywhere on the West African coast, retread them and ship them out again free of duty.

●**United States** — The US Rubber Co. and the United Rubber Workers Union have agreed on a new contract affecting some 25,000 employees in US Rubber Co. plants in 11 States. This arranges for a wage increase of 14½ cents over two years for employees of the company's tyre manufacturing plants, and 8½ cents per hour over two years for employees of the company's diversified manufactured products. The agreement expires on June 1 1963.

●**West Germany** — Continental Gummi-Werke AG, one of West Germany's leading rubber tyre manufacturers, had a turnover of DM884m. in 1960 compared with DM778m. in 1959, it was announced this week. An increase in turnover during the current year was likely, and it was quite possible that the DM1,000m. level would be passed, the directors stated.

●**Holland** — The Vredestein Rubber Concern of the Hague will shortly issue about 2.6m. guilders of new shares on a one new share for each five old shares subscription basis.

●**Russia** — R. H. Windsor announced in Moscow that it sold £30,000 worth of extruders at its British Trade Fair stand, and received advance orders for a further £16,000 worth. Polish and Rumanian organizations are also said to be contemplating placing orders.

●**Argentina** — The President of the Buenos Aires Stock Exchange has announced the results of an enquiry into the 1961 investment plans of 590 firms. Among the plans of 371 of these firms figure the investment of 1,125m. pesos (£4,891,304) in petrochemicals, and 363.8m. pesos (£1,581,739) in plastics.

●**Australia** — The Tariff Board has introduced a temporary duty of 3d. a lb. on polythene resins, apart from high density polythene. The move has been taken to protect the home producer — Imperial Chemical Industries of Australia and New Zealand. A report from the Tariff Board says that this company had reduced its price from 44½d. to 34d. a lb., but had still been unable to capture 'a sufficient share' of the home market. 'World over-production' of polythene is mentioned in the report. Present total consumption of the material in Australia is 13,000 tons. Imports last year were about 8,000 tons.

●**Borneo** — Sarawak is to receive a UK grant of £213,000 towards the cost of buying plant and equipment for the Public Works Department to enable road construction to be speeded up. Feeder roads, particularly, are needed in order to open up new land for rubber planting.

●**United States** — The B. F. Goodrich Co. is investing an additional $2m. on expansion and modernization of its Akron tyre production facilities. Work on the expansion, designed to improve and enlarge facilities for production of airplane and off-the-highway tyres, is already under way and is expected to be completed before the end of 1961. Approximately 60% of the total programme will be for tyres, the remainder being for other product divisions.

'You have 25 seconds to beat the clock starting now'—540

Two UK Plants for Nylon 6

PREPARING FOR INCREASING INDUSTRIAL USES OF NYLON

COURTAULDS is planning to build a plant for the manufacture of nylon 6 polymer. The cost is not disclosed, but the plant will have a capacity of between 20m. and 25m. lb. a year. Twenty-four hours after the Courtaulds announcement, I.C.I. stated that it had concluded a patent agreement on the nylon 6 process with a Swiss firm, and was planning to produce the material at Severnside.

Last year Courtaulds acquired the know-how of the caprolactam process from the Italian firm Snia Viscosa of Milan, with which it is associated. Ten thousand tons of caprolactam, the monomer for nylon 6, will be produced, and toluene for the process will be obtained from a Courtauld's unit at Spondon, Derbyshire.

At present the nylon made in the UK by British Nylon Spinners (jointly owned by I.C.I. and Courtaulds) is nylon 66. Nylon 6 is said to be more suitable for the industrial field, in which the number of nylon applications is shooting up rapidly, and much activity has taken place on the subject recently.

I.C.I., for instance, held negotiations last year with Russia over the purchase of a Soviet caprolactam process, but no agreement was reached.

Agreement With Swiss Firm

The agreement that I.C.I. has now signed is with Emser Werke AG/Inventa AG of Switzerland, the company acquiring rights for the technical information and patents relating to Emser Werke/Inventa's new processes for the manufacture of caprolactam and nylon 6. I.C.I. says that its design work is well advanced and construction of plants will start shortly. As announced previously (July 1960), production will commence early in 1963.

Caprolactam will be made initially in a plant of 15,000 tons a year capacity to be erected on I.C.I.'s Severnside site, and will be available for general sale. Concurrently, a large-scale plant will also be built for the manufacture of the polymer.

Plastics Figures Up

A BRIGHTER outlook for plastics manufacturers was indicated by official Board of Trade statistics released this week. They showed that net sales of UK plastics materials during the first quarter of 1961 were 143,400 tons — an increase of 1,900 tons over the same period last year.

Another encouraging sign was that manufacturers' stocks, although they amounted to 104,400 tons at the end of the period, rose only slightly compared with the steep rise last year.

Sales of polystyrene increased by 1,400 tons to 12,300 tons between the end-1960 and first-1961 quarters — indicating that recent extensive price cuts by UK manufacturers are having their effect.

Exports of plastics materials were 5,434 tons more than in the first quarter of 1960 and imports were 2,861 tons down, as shown in detailed figures previously published in *RPW* (May 13, 731).

Full figures will be published in next week's *RPW*.

Rope-form DMC

BIP CHEMICALS LTD. is producing a new Beetle polyester dough moulding compound. This is a general purpose type of Beetle DMC in an extruded rope form, which is now available for evaluation trials. The company says that the material has been developed to facilitate handling during the moulding operation, particularly the loading of multi-impression tools. It recommends that it should be moulded by the procedure used for Bettle DMC Type A.

Extruded strip of the new dough moulding compound

Rope form DMC is beige (natural) in colour. A limited range of other colours is available. It is made in nominal diameters of 1in. and 1½in. of uniform weight per unit length.

The bulk factor of the compound is slightly greater than one, and it can be stored for three months at room temperature.

FIND YOUR WAY ROUND

INTERPLAS 61

International Plastics Exhibition at Olympia June 21-July 1

The June 17 issue of *Rubber and Plastics Weekly* will be a special exhibition issue providing a quick, unique guide to Interplas 61. It is sectionalized by methods of fabrication—Extrusion, Injection Moulding, Vacuum Forming, Casting, etc.—so that a visitor can mark off immediately stands he is interested in. Extra copies will be available from 131 Gt. Suffolk Street, S.E.1. or from our stand at the exhibition—BB537.

Quick Process by Vitesta

A RANGE of glass fibre divan bases introduced by Vitesta Ltd. are said by the company to be 'Some of the first fruits of Vitesta's policy of surveying a wide range of consumer and producer goods for new applications of reinforced plastics'.

This five-month-old subsidiary of Vitafoam Ltd., the latex foam manufacturers, is already moulding several chairs, including a new double shell easy chair by its design consultant, Aidron Duckworth, introduced at the 1961 Furniture Show. Among their engineering mouldings are refrigeration components and some fabrications made specially for Associated Electrical Industries Ltd. and also British Railways.

The establishment of Vitesta is said to be 'a major step in making Vitafoam a complete source of modern furniture components'. Products manufactured include moulded latex foam cushions, Vitaweb rubber strapping or hook-on platforms, and carpet underlay.

Under the direction of its technical manager, Mr Charles Gleadle, Vitesta is equipping for mass production. Its second and third presses (for matched metal moulding) will be delivered within a year. It is completing a 240ft. conveyor and oven system for efficient curing.

Vitesta declares that it 'expects to pioneer new methods of production and costing in the reinforced plastics industry much as Vitafoam brought new practices to the latex foam industry. In following a course similar to that of the parent company, Vitesta expects similar results of a rapid increase in demand and relatively lower costs'.

The company has already met with a very good response from the furniture industry, and is now working on the development of new furniture shells.

IRI Foundation Lecture 1961

Some Ancillary Aspects of Compounding

By J. W. DENSON, FIRI. A condensed version of the lecture delivered in Birmingham on June 2. The lecture will be printed in full in a future issue of the Transactions of the Institution of the Rubber Industry

SOME 30 years ago a lecture on compounding would have excited great interest. Today, compounding information is being published at such a rate that it is difficult to read it all, let alone digest it. This factor, together with the sudden flood of text books, covering all phases of compounding, which have appeared in recent years, make it difficult to provide new material for a lecture of this type on compounding itself.

One of the main objects of the Institution of the Rubber Industry, as stated in the transactions, is: 'To provide a means of association between persons interested in the wider aspects of all sections of the industry including the production, investigation, manufacture and applications of rubber'.

With these thoughts in mind certain ancillary aspects of compounding have been selected which may prove of wider interest than compounding itself.

For want of a better word, compounder, in its widest possible sense, is used here as indicating the scientifically trained man who is an expert in all the various phases of rubber technology.

These phases are: 1, materials; 2, formulae; 3, processes; 4, technical personnel. The development and control of formulae will be dealt with first. It is carried out successfully in many diverse ways, depending on the product, the size and type of the organization and views of the management.

No One System

A system of value in the tyre world is not necessarily the best for the hose or shoe products world, whilst the system used in a small organization could well lead to chaos in a large one and the converse to bankruptcy in the small one. For these reasons there is no one system which is best for all organizations. The optimum system will depend on the make up and conventions of the organization and will also be influenced by the personalities of the men in charge of compounding, production and design. Probably the most highly organized systems are used by the very large companies in their tyre compounding divisions. This is due, of course, to the immense volume of business carried out, and the great potentials for profit or loss which can occur as the result of good or bad formulae.

The thought that the use of a bad formula for only one day may result in the production of many thousands of expensive but defective tyres, on which there may be a large or even total loss, engenders a somewhat more cautious approach to any new ideas by the tyre compounder than by his counterpart in other fields of production. The result is that significant changes in tyre formulae are only made relatively slowly and with an exhaustive amount of testing and consequent expense. The only really satisfactory method of testing is by means of carefully controlled road service tests.

Poor Forecasters

The laboratory testing of tyres, whilst informative about certain defects, does not give a reliable picture of service life. Laboratory abrasion machines are still notoriously poor forecasters. Abrasion resistance is not a fundamental property of a mix, but is probably the resultant of more fundamental properties such as strength, elongation, tear resistance, modulus, hysteresis loss, COFX and resistance to thermal oxidative breakdown, etc. If this is accepted, it should be possible to evaluate the relative importance of each of these factors in the various types of abrasive service met with. Once having achieved this point, it should be relatively simple to calculate mathematically the relative abrasion resistance of any compound in any abrasive service for which the factor values have been determined. Admittedly, a great deal of work would be involved, but an approach of this type could well attain more success than we have obtained after 50 years of struggle with laboratory abrasion machines. These machines assign an arbitrary value to each of the physical properties and since each type of abrasive service probably requires a different combination of properties, this fact may explain their occasional successes and their painful lack of reliability when testing any change from a known standard.

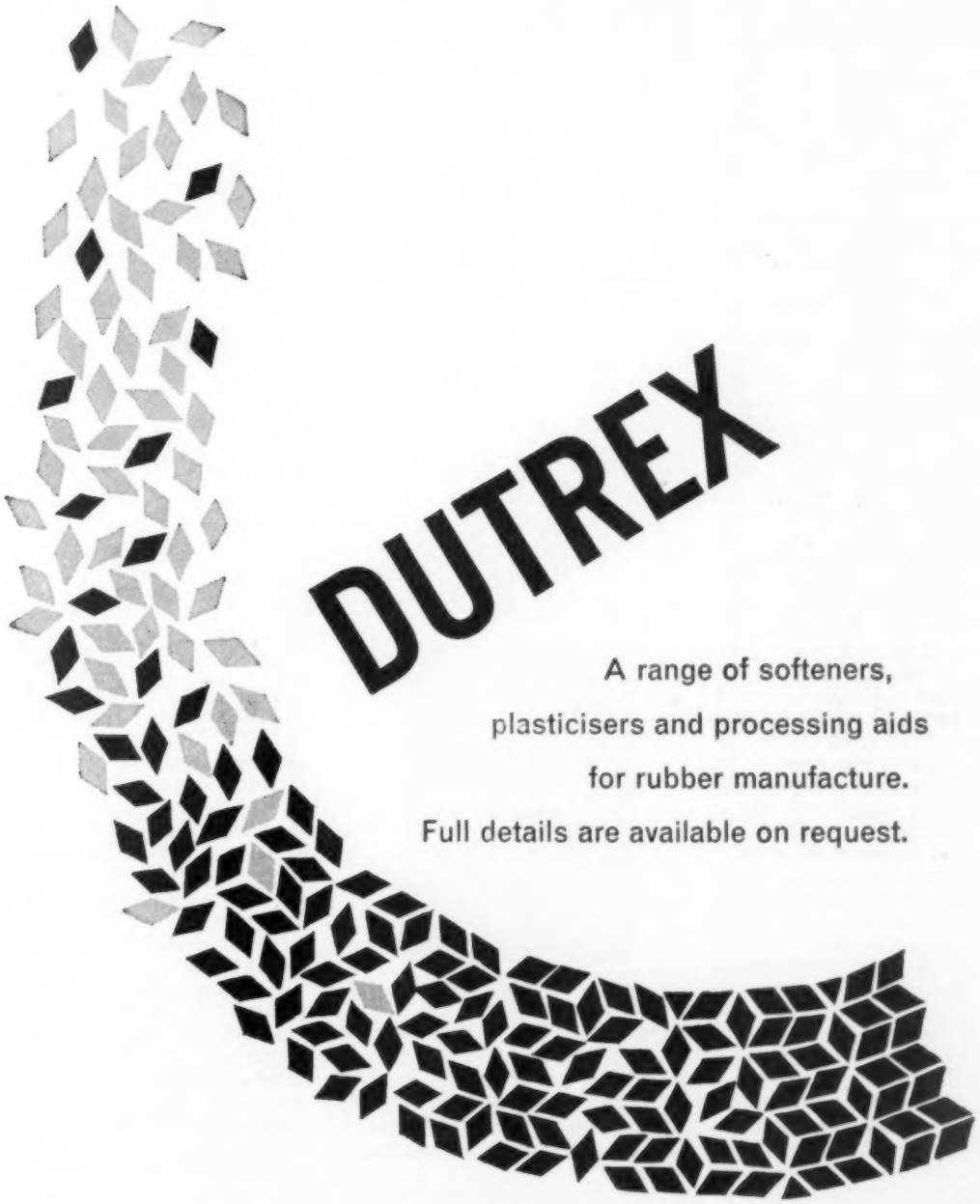
Even the road testing of tyres has to be kept continuously under review, since a totally incorrect picture can easily be obtained of what will happen when the product is received and used by the actual consumer.

Small Portion of the Picture

The net result is that any given test vehicle can only give a small portion of the complete picture and many test vehicles, tyre sets and test routes are necessary to give a picture reliable enough to justify the final test step of a limited production run. This consists of putting a day, week or month's production, depending on the volume produced, into service with the general public and identified in such a way that any complaints can be correlated with the particular test. Obviously this use of the general consumer for test purposes is fraught with danger to product reputation, and can only be used as the final arbiter when all conceivable small scale tests have proved satisfactory. These so called small scale tests normally involve from 1m. to 2m. tyre miles or more. It will be seen from this that a tyre compounding change can mean a very expensive job of testing and is not one to be entered on lightly, or without a valid justification for the expense which will be incurred.

Such justification would be given by a new material with a potential for equal or better life at a lower cost, a demand for a higher quality level, a review of current materials revealing an unforseen potential or a demand for a new type of service, etc.

Due to the volume of this work, and the long term nature of some of it, it is almost always handled by a section of compounders who are divorced from normal production troubles. This has its disadvantages as well as advantages, since the compounds tend to be developed with the material economics and consumer aspects emphasized rather more heavily than the processing aspects. This may well cause more hardship



DUTREX

A range of softeners,
plasticisers and processing aids
for rubber manufacture.
Full details are available on request.

Shell Chemicals

SHELL CHEMICAL COMPANY LIMITED

LONDON
BIRMINGHAM
MANCHESTER
GLASGOW
BELFAST
DUBLIN

Regional Offices
Villiers House, 41-47 Strand, London, W.C.2. *Tel: TRAfalgar 1277.*
Gloucester House, 65 Smallbrook, Ringway, Birmingham 5. *Tel: Midland 8811.*
144-146 Deansgate, Manchester 3. *Tel: Deansgate 2411.*
Royal London House, 48-54 West Nile Street, Glasgow, C.1. *Tel: City 3391.*
16-20 Rosemary Street, Belfast, Northern Ireland. *Tel: Belfast 26094.*
33-34 Westmoreland Street, Dublin, Republic of Ireland. *Tel: Dublin 72114.*

SHELL and DUTREX are registered trade marks.

and consequent cost than is strictly necessary in the production departments.

Compounding of General Rubber Goods

In the compounding of articles other than tyres such as hose, mouldings and shoe products a rather different atmosphere not only prevails but is very necessary. The usually less complicated service conditions, the smaller volume of production and the — one hesitates to say more accurate picture but at least the less inaccurate picture — presented by laboratory tests, does enable the general rubber products compounder to show greater elan and make more sweeping and faster compound changes than his tyre counterpart.

In the shoe products field whilst certain lines remain fairly stable, fashion and sales appeal exert their influence and demand a flexible and ever changing series of compounds varying in hardness, wear, colour and price. The compounder is expected to produce these like a magician with a hat, or a cook with a bulging recipe book. Needless to say, laboratory tests are relied on to a large extent and wear tests are used for confirmation rather than as the final criteria.

In the hose and moulded goods world, too, customer demands for novel service conditions have to be satisfied rapidly, and consequently there is a greater need to compromise certified service life with rapid delivery. Put into simple language, a 90% guaranteed article in a month is usually far better than a 100% certainty in 12 months.

A significant difference (between the two types of compounder) lies in what can be termed the compounder requirement per lb. of product. If the number of compounding personnel employed is divided by the output of product in lb. weight, the result is a compounder requirement of X compounders per 1,000lb. of product. This requirement will vary from product to product, but, in general, will be found to be much greater for general rubber goods than for tyres, despite the exhaustive test work which the latter demand. The reason for this lies mainly in three factors: firstly, the much higher volume output of tyres resulting in a much greater productivity for any specific piece of compounding work; secondly, the relative simplicity of tyre compounds compared with general rubber goods compounds; and, thirdly, the much greater degree of what the Americans call 'custom built business'.

Most of the general rubber goods are produced for specific customers with a special service in mind. Inevitably this leads to the multiplication and complication of lines of product and this, in turn, to a lowering of productivity for any particular piece of compounding effort. The importance of this difference can vary in different organizations, particularly where an organization produces both tyres and general rubber goods. There can arise a tendency to judge relative efficiencies on this basis of compounder requirement per unit weight of product with unfortunate results, unless it is corrected and a truer basis of comparison selected. Unfortunately, no convenient system seems to exist that does not contain a very large element of personal judgment.

So far industrial and general rubber goods compounding attitudes have been considered as if they were similar for all types of product in this field. They are obviously not, and can vary all the way from the tyre attitude of exhaustive testing before any significant change, to products where radical changes can be made based on the compounder's experience plus simple laboratory tests. In general however the bulk of general rubber goods compounding does lend itself to far more flexibility than tyre compounding. This very flexibility can however end up by being a disadvantage in some respects. Production management demand compounds which will process under all sorts of conditions. This usually means various modifications, and if we add to these modifications those which the compounder dreams up from time to time in the interests of costs, processing or just the desire to try something new, we end up with a formulation which may contain up to 20 different items, and no one appears to know exactly why some of those items are there or what is their function in that particular formula. The main thing is that the formulation works, it processes well and gives satisfactory performance. However, the disadvantages of the mill room complications such as the increased number of materials to be handled and weighings to be made do call for a review and streamlining effort from time to time.

Tyre formulae generally retain their simple, functional and streamlined look because they are conceived, developed and tested as a series of discontinuous episodes, which, due to the cost of retesting remain in a relatively frozen state for the period of their life. Compared with this state of affairs general rubber goods formulae tend to undergo continuous development and modification, which usually means additional items, and only occasionally do they get the streamlining treatment which they need from time to time.

2,500 Ingredients

Turning to the materials themselves, J. M. Buist has estimated that, in 1950, compounders were able to choose their ingredients from a list totalling 1,665. In 1957 he estimated that a list covering the same range would total at least 2,200. Today it must be over the 2,500 mark.

This wide variety does mean that a lot of new materials, or new sources of materials, will not be evaluated and that those materials which have the fullest supporting technical data stand the best chance of getting what may be termed expensive consideration by the compounder. More and more firms are realizing this, and hence the increasing number of laboratories being built for purely customer technical service.

There should be even more frankness on the part of the supplier concerning the chemical or technical make up of his materials. Many trade names sometimes conceal one common material. For instance MBT is sold under at least 17 different names whilst a further nine consist of mixtures of MBT with other accelerators.

Testing the New Material

The extent of the testing which will be carried out on a new material,

The 1961 IRI Foundation Lecturer

J. W. Denson, the 1961 IRI foundation lecturer, was educated at the Rugely Grammar School and the Wolverhampton and Staffordshire Technical College. He joined the

Goodyear Tyre and Rubber Co. Ltd. in 1927 as an analytical chemist in the materials laboratory and was appointed chief chemist in 1948. He has made three visits to America, in 1938, 1948 (when he was present at Goodyear's 50th anniversary) and in 1954.

or new source of a material, depends upon a number of factors, the primary ones being: (a) product in which it is used; (b) type of ingredient.

Laboratory tests for rubber products as a means of evaluating their quality are still extremely inadequate and cannot be relied on to give more than an unreliable forecast of their service life. It would appear to be a fruitful field for a co-operative research effort to develop such laboratory tests.

The control of existing raw materials is important and is a field where much ingenuity, time, chemical knowledge and rubber technology can be used. The materials used in the rubber industry for the purposes of compounding are rarely chemically pure, but are commercial materials containing impurities which v a r y in type and amount depending on their source. Their physical shape and properties can also vary even though their chemical constitution remains constant. These impurities and the physical differences can cause significant changes in their compounding behaviour; thus the iron oxides vary greatly in their affect upon ageing, due to their associated impurities of copper, manganese and sulphates.

A compounding test on each shipment of material would be ideal but extremely costly and time consuming. The cost of material control has to be related to the loss which it prevents: obviously it would be stupid to spend £1,000 per year to prevent a loss of £100. Fortunately materials of today are in general very much more consistent than they were 30 years ago. With certain materials from certain suppliers it is possible to forgo normal control test procedures and merely check say every tenth shipment instead of each one. A system of delegated inspection is also possible whereby the supplier provides a test certificate with each lot. Other suppliers need rather closer checking.

Material Situation as a Whole

The importance of milestones in the development of an industry varies according to the time and place from which they are viewed. To a 20th century compounder there only appear to be two developments of epoch making importance in our industry in the whole of the 19th century. First, the invention of the mill or pickle by Hancock in the third decade, which inaugurated compounding on the very lowly plane of providing a means of adultration; secondly, the discovery of vulcanization in the fourth decade. With the coming of the 20th century and the tyre industry, epoch making events in the world of rubber compounding appeared to have occurred in every decade. In the first decade we had organic accelerators; in the second the abrasion resisting blacks; in the third antioxidants; in the fourth the first commercially successful synthetic rubbers; in the fifth decade, under the grim stimulation of war, the successful commercial use of general purpose synthetics, the nitriles, the butyls, the polysulphides, the silicones and the self reinforcing polyurethanes were developed.

After such a vintage decade, for the introduction of a new polymer to be anything more than an incident, it must obviously have a shattering effect on the existing collection of polymers, rather than just to complement them. During the sixth decade we have had the outstanding work of Ziegler and Natta in the field of controlling polymerization. It is highly probable that, for the seventh decade, their work may well form the basis of polymers which could have the shattering effect that has just been mentioned.

Zinc oxide reached its peak as the most important reinforcing agent in the second decade of this century, when it was challenged and displaced by channel black. This took place despite many millions of dollars spent on research by the American zinc oxide industry in countering the attack.

The use of butyl synthetic rubber shows the other side of the picture. With the introduction of the tubeless tyre in 1953 the consumption of butyl suffered a very serious set back. However, a very determined applied research and sales promotional effort by the butyl manufacturers not only regained lost ground by diversifying and increasing the number of uses and applications, but uncovered some new ideas on how tyres could be improved. These posed a very serious threat to the bulk usage of SBR in passenger tyres and resulted in SBR modifications being developed to give the same improvements in riding comfort, noise level and skid resistance. This threat still remains and may grow.

In its turn, in the last decade, channel black has been displaced by the furnace blacks — a move which originally caused a great deal of trouble, but which later was to prove of great value technically to the compounder. In their turn the furnace blacks have been modified and diversified until we now have, in addition to the original HAF black, no less than six types of furnace black suitable for high abrasion purposes. The number of types of black available is now over 25 covering nearly all the requirements from a mere filler to those conferring unusual electrical or high strength or abrasion resistant properties. The only clouds visible in the black manufacturer's sky at the present time are the still unrealized potentials of the solid self-reinforcing polyurethanes. These potentials, despite their size and attractiveness, still seem to be as far away as ever.

In the non black, reinforcing pigment world, the compounders 40-year-old yearning for a white carbon black has been only partially appeased through the various silicates and silicas, or combinations of these with an organic reinforcing agent such as reinforcing resins of the HI-styrene or phenolic type. This yearning will never c o m p l e t e l y vanish, so long as it is possible to attain better results, technically or economically, with the carbon blacks than it is with the non black materials. This yearning is caused by several factors: firstly, the desire to market attractive colourful products; secondly, the desire to improve working conditions in the millroom. With most modern and up-to-date black mixing equipment, comprising bulk handling from tankers or tote boxes, automatic weighing and feeding direct into the mixer it can certainly be claimed that carbon black is untouched by human hands. Unfortunately, and just as certainly, the converse cannot be claimed.

There always appear to be tiny leaks somewhere or other leading to dark, dismal and dirty millrooms, and inevitably such conditions lead to poorer morale and workmanship. No solution is apparent at the moment and it is doubtful whether any of the present lines of approach, such as the self-reinforcing polymers, reinforcing resins, silicates, silicas or finely divided aluminium oxide are capable of extension to produce an economical solution to the problem within the next decade. It may well be possible, however, that, with our increasing knowledge of reinforcement and the vast amount of thought being given to this subject, someone will do for reinforcement that which Whinfield and Dixon did on Terylene, *i.e.* predicate the structure necessary and then proceed to develop a material with this structure.

The Polymer Situation

The polymer situation is a most interesting one. Never before have compounders been so blessed or so embarrassed with such a variety of materials. Blessed, because they can now tackle a far wider range of requirements than ever b e f o r e.

and consequent cost than is strictly necessary in the production departments.

Compounding of General Rubber Goods

In the compounding of articles other than tyres such as hose, mouldings and shoe products a rather different atmosphere not only prevails but is very necessary. The usually less complicated service conditions, the smaller volume of production and the — one hesitates to say more accurate picture but at least the less inaccurate picture — presented by laboratory tests, does enable the general rubber products compounder to show greater elan and make more sweeping and faster compound changes than his tyre counterpart.

In the shoe products field whilst certain lines remain fairly stable, fashion and sales appeal exert their influence and demand a flexible and ever changing series of compounds varying in hardness, wear, colour and price. The compounder is expected to produce these like a magician with a hat, or a cook with a bulging recipe book. Needless to say, laboratory tests are relied on to a large extent and wear tests are used for confirmation rather than as the final criteria.

In the hose and moulded goods world, too, customer demands for novel service conditions have to be satisfied rapidly, and consequently there is a greater need to compromise certified service life with rapid delivery. Put into simple language, a 90% guaranteed article in a month is usually far better than a 100% certainty in 12 months.

A significant difference (between the two types of compounder) lies in what can be termed the compounder requirement per lb. of product. If the number of compounding personnel employed is divided by the output of product in lb. weight, the result is a compounder requirement of X compounders per 1,000lb. of product. This requirement will vary from product to product, but, in general, will be found to be much greater for general rubber goods than for tyres, despite the exhaustive test work which the latter demand. The reason for this lies mainly in three factors: firstly, the much higher volume output of tyres resulting in a much greater productivity for any specific piece of compounding work; secondly, the relative simplicity of tyre compounds compared with general rubber goods compounds; and, thirdly, the much greater degree of what the Americans call 'custom built business'.

Most of the general rubber goods are produced for specific customers with a special service in mind. Inevitably this leads to the multiplication and complication of lines of product and this, in turn, to a lowering of productivity for any particular piece of compounding effort. The importance of this difference can vary in different organizations, particularly where an organization produces both tyres and general rubber goods. There can arise a tendency to judge relative efficiencies on this basis of compounder requirement per unit weight of product with unfortunate results, unless it is corrected and a truer basis of comparison selected. Unfortunately, no convenient system seems to exist that does not contain a very large element of personal judgment.

So far industrial and general rubber goods compounding attitudes have been considered as if they were similar for all types of product in this field. They are obviously not, and can vary all the way from the tyre attitude of exhaustive testing before any significant change, to products where radical changes can be made based on the compounder's experience plus simple laboratory tests. In general however the bulk of general rubber goods compounding does lend itself to far more flexibility than tyre compounding. This very flexibility can however end up by being a disadvantage in some respects. Production management demand compounds which will process under all sorts of conditions. This usually means various modifications, and if we add to these modifications those which the compounder dreams up from time to time in the interests of costs, processing or just the desire to try something new, we end up with a formulation which may contain up to 20 different items, and no one appears to know exactly why some of those items are there or what is their function in that particular formula. The main thing is that the formulation works, it processes well and gives satisfactory performance. However, the disadvantages of the mill room complications such as the increased number of materials to be handled and weighings to be made do call for a review and streamlining effort from time to time.

Tyre formulae generally retain their simple, functional and streamlined look because they are conceived, developed and tested as a series of discontinuous episodes, which, due to the cost of retesting remain in a relatively frozen state for the period of their life. Compared with this state of affairs general rubber goods formulae tend to undergo continuous development and modification, which usually means additional items, and only occasionally do they get the streamlining treatment which they need from time to time.

2,500 Ingredients

Turning to the materials themselves, J. M. Buist has estimated that, in 1950, compounders were able to choose their ingredients from a list totalling 1,665. In 1957 he estimated that a list covering the same range would total at least 2,200. Today it must be over the 2,500 mark.

This wide variety does mean that a lot of new materials, or new sources of materials, will not be evaluated and that those materials which have the fullest supporting technical data stand the best chance of getting what may be termed expensive consideration by the compounder. More and more firms are realizing this, and hence the increasing number of laboratories being built for purely customer technical service.

There should be even more frankness on the part of the supplier concerning the chemical or technical make up of his materials. Many trade names sometimes conceal one common material. For instance MBT is sold under at least 17 different names whilst a further nine consist of mixtures of MBT with other accelerators.

Testing the New Material

The extent of the testing which will be carried out on a new material,

The 1961 IRI Foundation Lecturer

J. W. Denson, the 1961 IRI foundation lecturer, was educated at the Rugely Grammar School and the Wolverhampton and Staffordshire Technical College. He joined the

Goodyear Tyre and Rubber Co. Ltd. in 1927 as an analytical chemist in the materials laboratory and was appointed chief chemist in 1948. He has made three visits to America, in 1938, 1948 (when he was present at Goodyear's 50th anniversary) and in 1954.

or new source of a material, depends upon a number of factors, the primary ones being: (a) product in which it is used; (b) type of ingredient.

Laboratory tests for rubber products as a means of evaluating their quality are still extremely inadequate and cannot be relied on to give more than an unreliable forecast of their service life. It would appear to be a fruitful field for a co-operative research effort to develop such laboratory tests.

The control of existing raw materials is important and is a field where much ingenuity, time, chemical knowledge and rubber technology can be used. The materials used in the rubber industry for the purposes of compounding are rarely chemically pure, but are commercial materials containing impurities which v a r y in type and amount depending on their source. Their physical shape and properties can also vary even though their chemical constitution remains constant. These impurities and the physical differences can cause significant changes in their compounding behaviour; thus the iron oxides vary greatly in their affect upon ageing, due to their associated impurities of copper, manganese and sulphates.

A compounding test on each shipment of material would be ideal but extremely costly and time consuming. The cost of material control has to be related to the loss which it prevents: obviously it would be stupid to spend £1,000 per year to prevent a loss of £100. Fortunately materials of today are in general very much more consistent than they were 30 years ago. With certain materials from certain suppliers it is possible to forgo normal control test procedures and merely check say every tenth shipment instead of each one. A system of delegated inspection is also possible whereby the supplier provides a test certificate with each lot. Other suppliers need rather closer checking.

Material Situation as a Whole

The importance of milestones in the development of an industry varies according to the time and place from which they are viewed. To a 20th century compounder there only appear to be two developments of epoch making importance in our industry in the whole of the 19th century. First, the invention of the mill or pickle by Hancock in the third decade, which inaugurated compounding on the very lowly plane of providing a means of adultration; secondly, the discovery of vulcanization in the fourth decade. With the coming of the 20th century and the tyre industry, epoch making events in the world of rubber compounding appeared to have occurred in every decade. In the first decade we had organic accelerators; in the second the abrasion resisting blacks; in the third antioxidants; in the fourth the first commercially successful synthetic rubbers; in the fifth decade, under the grim stimulation of war, the successful commercial use of general purpose synthetics, the nitriles, the butyls, the polysulphides, the silicones and the self reinforcing polyurethanes were developed.

After such a vintage decade, for the introduction of a new polymer to be anything more than an incident, it must obviously have a shattering effect on the existing collection of polymers, rather than just to complement them. During the sixth decade we have had the outstanding work of Ziegler and Natta in the field of controlling polymerization. It is highly probable that, for the seventh decade, their work may well form the basis of polymers which could have the shattering effect that has just been mentioned.

Zinc oxide reached its peak as the most important reinforcing agent in the second decade of this century, when it was challenged and displaced by channel black. This took place despite many millions of dollars spent on research by the American zinc oxide industry in countering the attack.

The use of butyl synthetic rubber shows the other side of the picture. With the introduction of the tubeless tyre in 1953 the consumption of butyl suffered a very serious set back. However, a very determined applied research and sales promotional effort by the butyl manufacturers not only regained lost ground by diversifying and increasing the number of uses and applications, but uncovered some new ideas on how tyres could be improved. These posed a very serious threat to the bulk usage of SBR in passenger tyres and resulted in SBR modifications being developed to give the same improvements in riding comfort, noise level and skid resistance. This threat still remains and may grow.

In its turn, in the last decade, channel black has been displaced by the furnace blacks — a move which originally caused a great deal of trouble, but which later was to prove of great value technically to the compounder. In their turn the furnace blacks have been modified and diversified until we now have, in addition to the original HAF black, no less than six types of furnace black suitable for high abrasion purposes. The number of types of black available is now over 25 covering nearly all the requirements from a mere filler to those conferring unusual electrical or high strength or abrasion resistant properties. The only clouds visible in the black manufacturer's sky at the present time are the still unrealized potentials of the solid self-reinforcing polyurethanes. These potentials, despite their size and attractiveness, still seem to be as far away as ever.

In the non black, reinforcing pigment world, the compounders 40-year-old yearning for a white carbon black has been only partially appeased through the various silicates and silicas, or combinations of these with an organic reinforcing agent such as reinforcing resins of the HI-styrene or phenolic type. This yearning will never c o m p l e t e l y vanish, so long as it is possible to attain better results, technically or economically, with the carbon blacks than it is with the non black materials. This yearning is caused by several factors: firstly, the desire to market attractive colourful products; secondly, the desire to improve working conditions in the millroom. With most modern and up-to-date black mixing equipment, comprising bulk handling from tankers or tote boxes, automatic weighing and feeding direct into the mixer it can certainly be claimed that carbon black is untouched by human hands. Unfortunately, and just as certainly, the converse cannot be claimed.

There always appear to be tiny leaks somewhere or other leading to dark, dismal and dirty millrooms, and inevitably such conditions lead to poorer morale and workmanship. No solution is apparent at the moment and it is doubtful whether any of the present lines of approach, such as the self-reinforcing polymers, reinforcing resins, silicates, silicas or finely divided aluminium oxide are capable of extension to produce an economical solution to the problem within the next decade. It may well be possible, however, that, with our increasing knowledge of reinforcement and the vast amount of thought being given to this subject, someone will do for reinforcement that which Whinfield and Dixon did on Terylene, *i.e.* predicate the structure necessary and then proceed to develop a material with this structure.

The Polymer Situation

The polymer situation is a most interesting one. Never before have compounders been so blessed or so embarrassed with such a variety of materials. Blessed, because they can now tackle a far wider range of requirements than ever b e f o r e.

WHAT TO STOCK AND WHAT NOT

Given a wide range of essential raw materials, each designed for the same job but varying in efficiency and specific application, the manufacturer who makes use of these materials must at some stage decide how many of the range to keep in stock.

This is one of the problems which confront the rubber compounder. With a considerable range of non-staining antioxidants from which to choose, he has to decide which to use for particular applications and, hence, which to stock. In some instances there are special requirements that dictate the type of antioxidant to be used, e.g. relative toxic hazard, ease of dispersion in latex compounds, etc. In the general case it has to be decided what level of efficiency is required.

There are two approaches to the problem. In the first instance, where the manufacture of a number of different types of article is all on a reasonable scale, there are many reasons in favour of maintaining a stock of several antioxidants. The rubber articles can be classified according to the efficiency of antioxidant required, as follows:—

Class A: for rubber articles that are relatively cheap and/or have only a short expectancy of service life—an antioxidant such as Nonox SP.

Class B: for rubber articles of medium quality and/or with expectancy of life of several years (e.g. more than three years)—a more efficient antioxidant, e.g. Nonox EX.

Class C: for rubber articles of high quality and/or with a long expectancy of service life—a highly efficient antioxidant e.g. Nonox WSP.

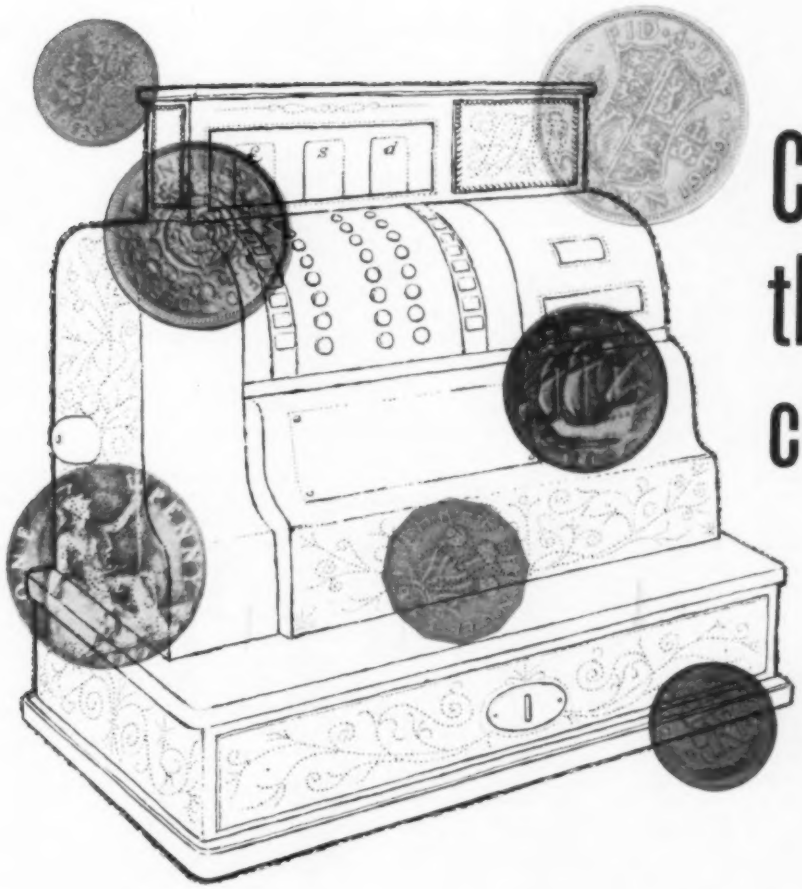
The actual choice of antioxidant within a group must be made on secondary considerations, e.g. the physical form of antioxidant most suited to the particular manufacturing process.

Alternatively, it may be more convenient for only one antioxidant to be held in stock. The question then is, which one? To decide this it is necessary to study the effect of antioxidant dosage on technical efficiency. Conventional ageing tests on rubber indicate that the protective effect is not proportional to the antioxidant dosage. Increasing increments of dosage have progressively smaller effects until a dosage is reached beyond which there is very little additional benefit. This can be called the 'optimum dosage'. Generally speaking, the more powerful the antioxidant, the lower is the 'optimum dosage'. Further, it can be demonstrated that the maximum effect (i.e. protective effect) depends on the antioxidant efficiency.

The two factors, high efficiency at low dosage and the technical effect at 'optimum dosage' or higher, favour the more efficient antioxidants. In circumstances such as these, the recommended antioxidant would be Nonox WSP or CNS, which can be used at 'optimum dosage' (ca. 1.0%) where maximum protective effect is required, and at selected lower dosages where economy demands and the application permits. Versatility is more readily achieved with an efficient antioxidant.

IMPERIAL CHEMICAL INDUSTRIES LIMITED, LONDON S.W.1

Advertiser's announcement. X196



Counting the cost

Some non-staining antioxidants may seem expensive in terms of purchase price per lb.—but this ignores the question of technical efficiency.

Calculating in terms of cost per unit of technical efficiency, a higher cost per lb. can well result in a lower cost per unit. A high degree of protection can only be achieved with an antioxidant of high technical efficiency. Further, an antioxidant of *high* technical efficiency can be used in *appropriate* dosages to obtain just the degree of protection required.

The I.C.I. range of non-staining antioxidants provides products of high efficiency suitable for a wide range of applications, whether the requirement is a high level of protection or low cost.

IMPERIAL CHEMICAL INDUSTRIES LIMITED

LONDON SW1 ENGLAND

ICI

X117

Embarrassed, because of the overlapping which now occurs. Even Neoprene with its unique combination of good weathering and oil resistance now has to think about the competition of nitrile-pvc mixtures. For the first 30 years of this century we had only one vulcanizable polymer which was commercially available. At the end of the second 30 years of this century we now have available for our use on a commercial scale at least 19 distinct genera of vulcanizable polymers each with many species.

With so many types and variations now available an attempt at classification is justified. Classification into genera and species is easy, but the family grouping is considerably more difficult. Should they be grouped on the basis of properties, uses, chemical composition, physical structure, methods of manufacture or raw materials?

Classification on the basis of properties could lead to considerable overlapping. Uses will vary from place to place and time to time, chemical composition could result in almost as many families as there are genera. Physical structure is a possibility but could lead to only one family. Manufacturing processes and raw materials can vary for the same polymer. With these considerations in mind, a hybrid classification scheme has been chosen which at least is felt to have the simple merit of ease in remembrance. It classifies polymers into: stereo-specific polymers, such as Hevea and polyisoprene; diene vinyls, such as SBR; highly saturated polymers, such as butyl rubber; saturated polymers such as Hypalon and the ethylene-propylene copolymers and a miscellaneous group which includes such rubbers as neoprene and the polysulphides.

This scheme is based, as far as possible, on using a dominant characteristic for the family grouping. The scheme is open to criticism on both the general and detailed basis but is an endeavour to present a more easily assimilated picture of the complicated polymer position. It is intended for people taking a general interest in compounding rather than for those taking a detailed interest in polymer physics or chemistry.*

Natural and Stereo-Rubbers

For many years we have been accustomed to look on natural rubber as one of our basic necessities. The synthetics have merely complemented it and eased the supply and price

Continued on page 881

*Charts explaining this classification in much greater detail will appear in the full version of this lecture, to be published in the IRI Transactions.

Birmingham's Connexion with Rubber

IRI FOUNDATION LECTURE 'BACK ON ITS HOME GROUND'

THE first foundation lecture of the IRI had resulted from a suggestion put forward by the Midland Section committee, recalled F. A. Jones, vice-president of the Institution of the Rubber Industry, at the dinner following the sixteenth foundation lecture delivered by J. W. Denson. 'Both Jack Denson and I were present at the first foundation lecture which was delivered in Birmingham in 1946', said Mr Jones. 'Since that lecture there have been 15 others rotating between London, Manchester and the Midlands, and tonight, in Birmingham, the foundation lecture is back on its home ground'.

Mr Jones, proposing the toast of the foundation lecturer, addressed more than 200 people at the Queen's Hotel, Birmingham, who had earlier been received by the president of the IRI, Sir John Dean, and Lady Dean.

In the 16 foundation lectures which had been delivered, Mr Jones stated, a large number of topics had been dealt with, all closely connected with the rubber industry. He congratulated Mr Denson on his choice of subject — 'Some Ancillary Aspects of Compounding' — since compounding in the sense in which it was now known had been invented by Charles Goodyear who could be regarded as the founder of the company with which Mr Denson was associated.

Mr Jones pointed out that Charles Goodyear had invented the vulcanization of rubber in America by heating together rubber and sulphur. It was recorded that he had been fortunate in having an early type of compounding ingredient — white lead — also present in his rubber compound, which had accelerated the change in the state of the rubber.

Goodyear had delayed patenting his invention and so had lost some of the priority and some of the credit for his invention. 'There is a moral here', the speaker added, 'but I will leave you to point it for yourselves'.

Mr Jones recalled that, working in Birmingham, Alexander Parkes had later discovered an alternative process to Goodyear's, whereby vulcanization of rubber could be achieved at ordinary temperatures by using, in place of sulphur, a sulphur derivative, namely sulphur monochloride. This procedure was called 'The Cold Cure Process'. Parkes had also produced 'Parkesine' from nitrocellulose, being therefore responsible for the development of one of the first plastics.

Birmingham had various important associations with rubber, Mr Jones went on; it was in that city that the first synthetic rubber had been made by Professor William Tilden working at Mason College, which had afterwards become the University of Birmingham. Tilden had found that he could polymerize isoprene to form rubber, and that he could make isoprene synthetically by the pyrolysis of turpentine. Tilden's first synthetic rubber sample, which was now nearly 70 years old, still existed, and was carefully preserved in the chemistry department of the University.

'I would also remind you that the name "rubber" is a Birmingham product', Mr Jones declared, 'and was used by Joseph Priestly, the discoverer of oxygen, who found while living in Birmingham that pencil marks on paper could be erased by rubbing with a piece of elastic gum from the new world'.

Replying, J. W. Denson supplied some of the background to Mr Jones's statement that the idea of a foundation lecture arose in the Midland Section. Seventeen years ago, he said, the Midland Section faced a crisis. In 1943 a 'keen type' had been invested as a member and he had held that the Institution was dead; and what was more appalling did not know it.

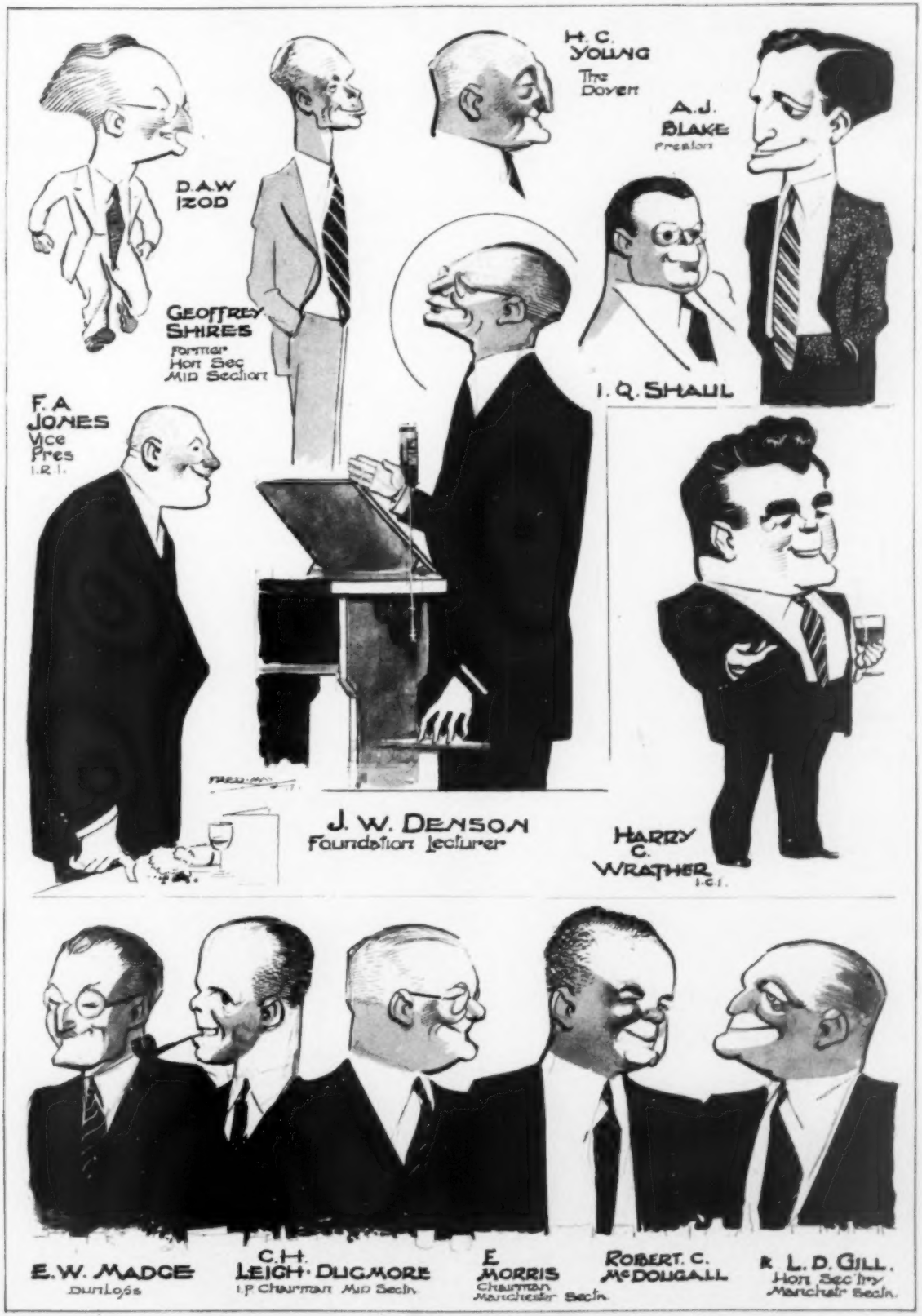
'In the circumstances we did the usual thing', said Mr Denson, 'and gave him a position of responsibility. He was elected to the committee, and from him came the suggestion that a prestige lecture should be held annually'.

At that time, said Mr Denson, the thought had never occurred to him that one day he would be asked to give the lecture.

Proposing the toast of the guests, W. C. Wilkes, chairman of the IRI Midland Section, referred to the happy association with the Plastics Institute in the Midlands and welcomed the PI Midland Section chairman A. A. Tomkins, and Mrs Tomkins. He also extended a special welcome to H. C. Young, the senior member of the Institution present at the dinner, J. Q. Shaul, Goodyear's production director, and the Mayor of Wolverhampton, Alderman C. H. Davies, who brought the speeches to a close with a short address which was both very Welsh and very witty.

AT THE IRI FOUNDATION LECTURE AND DINNER

by Fred May



From Start to Finish

BIP INTERESTS COVER ALL ASPECTS OF MANUFACTURE

ONE of the most interesting companies in the UK plastics industry, which has been in and out of the news for the past six months, is British Industrial Plastics Ltd. This is probably the only 'vertically organized' group in the plastics industry, covering all the aspects of manufacture from the raw materials to the finished products. At the end of January this year the group was taken over by Turner and Newall — a move expected to increase the effort being expended by both companies to expand the uses of synthetic materials in the building industry.

Other sections of the BIP group are also developing vigorously and new developments recently announced include the availability of two new polyester resins containing isophthalic acid (*RPW*, June 3, 847) and a new dough moulding compound in rope form (reported on page 863 of this issue).

Test Unit

The evolution of the group as such in the plastics industry really began in 1929 with the acquisition by the British Cyanides Company of a small plastics moulding factory, the Streetly Manufacturing Co. Ltd., as a testing and demonstration unit for the first thermosetting products of the company. These were resins based on the condensation of formaldehyde with amino salts such as urea, thiourea and melamine.

The Streetly Manufacturing Co. has now become one of the largest and best-equipped factories of its kind in the country.

Increasing demand for tools and moulds of correct design overtaxed the resources at Streetly, primarily due to difficulty in obtaining the highly-skilled labour needed, and this led to the establishment of a tool-making division in 1936 (in which year the name of the company was changed to its present title) at Tyburn Road, Birmingham. This was later (in 1945) registered as a separate company under the title BIP Tools Ltd.

Press Manufacture

The next problem to be overcome was the provision of hydraulic presses. In the early years of the plastics industry compression presses used were those designed for the rubber industry and little modification had been made in basic design and operation.

BIP considered that with the rapidly-growing competition from a wide range of newer thermoplastic moulding materials, a fundamental approach was necessary to modernize compression presses, and considerable research and development work was carried out. This resulted in the Bipel press and in the formation in 1950 of a new company, BIP Engineering Ltd., to manufacture and exploit it.

In the relatively short time that these two companies have been in existence both have achieved an international reputation, BIP Engineering has quadrupled in size and BIP Tools is currently being doubled in size.

Product Variety

During the years that these new companies have been springing up to deal with the problems arising in the use of the products of the parent company, these products have been growing in number and variety. Beetle resins and moulding powders are widely used in a number of basic industries. The production of resins is comparable to that of moulding powders and industries in which they are widely used include the textile, paper, motor car and furniture industries.

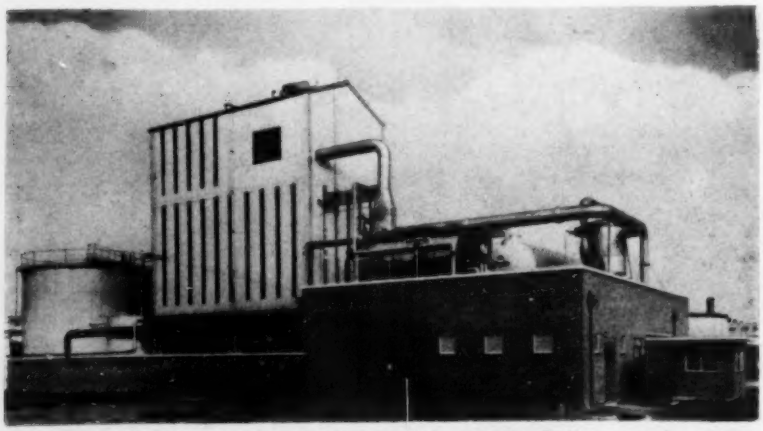
Crease resistance and water repellancy of textiles and wet strength of paper are all improved by the use of synthetic resins. As adhesives for wood BIP resins serve the furniture and chipboard manufacturers and coating resins are incorporated in lacquers for the car industry, where they impart finishes of high gloss and great durability.

Another field of application for the resins which is expected to increase considerably in the future is for the manufacture of reinforced materials for constructional work. The merger with Turner and Newall will permit a very substantial increase in the technical and financial resources of the group available for research and development in this direction.

BIP Reinforced Plastics Ltd. was formed in 1958 with its own factory equipped to produce, by a continuous process, a polyester resin sheet reinforced with glass fibre which has already become well known under the trade name Filon. This sheet is being used in rapidly increasing quantities for roofing, partitioning and other building purposes. A range of moulding compounds reinforced with appropriate fibres such as asbestos and glass fibre is being developed which have outstanding strength and electrical properties, in addition to good weather resistance.

Formaldehyde Plant

One of the most recent additions to the production plant at the Oldbury factory of BIP Chemicals is a plant for the production of formaldehyde which is one of the basic raw materials for the manufacture of aminoplastic moulding powders and



A recent addition to the production facilities at the Oldbury works of BIP Chemicals Ltd. is the formaldehyde plant. Manufactured from methanol, formaldehyde is a basic raw material for the manufacture of aminoplastics

A CROWNING ACHIEVEMENT

CABOT'S exclusive new process—patents applied for—provides a new family of oil furnace carbon blacks with unique properties.

REGAL 300

A NEW low modulus oil furnace black giving rubber properties similar to premium-priced channel black, but with a faster curing rate approaching that of an HAF black.
Its higher tensile strength and elongation, lower modulus and excellent reinforcement coupled with fast cure rate, offer a combination of properties not previously obtained by a single black type.

REGAL 600

A NEW low "structure" fine particle size oil furnace black with the excellent tread-wear resistance of an ISAF type, and giving promise of enhanced cutting and chipping resistance. Regal 600 provides higher tensile strength and elongation than ISAF black together with lower modulus and hardness.

CABOT

Regal

A NEW FAMILY OF CARBON BLACKS FROM CABOT

BOTH ARE ALREADY
IN FULL SCALE PRODUCTION
AT STANLOW

CABOT CARBON LIMITED

London Sales Office: 62 BROMPTON ROAD, LONDON S.W.3
Tel: KNightsbridge 7181 (5 lines) Telegrams Cabiak London Telex
Reg. Office and Works STANLOW ELLESMERE PORT CHESHIRE

resins. The complete layout includes storage for methanol and formaldehyde, a cooling tower, refrigeration plant and electric sub-station.

The process of manufacture uses methanol as its starting point, the only other route used commercially, from hydrocarbon gases, not being economic unless the plant is situated close to a source of natural gas, or a petroleum refinery or cracking plant. Two alternative routes from methanol are available, one consisting of oxidation using a mixed metallic oxide catalyst, the other of dehydrogeneration over a silver catalyst. With the oxide catalyst a high conversion is possible giving a good yield, a formaldehyde having a low methanol content. Equally good yields are obtainable with a silver catalyst, but it is necessary to distil if a low methanol content is required. A silver catalyst is used in the form of electrolytically deposited silver granules. The catalyst, which has to be refined to a high standard of purity, is very susceptible to poisoning, particularly from iron, and precautions have to be taken to ensure the necessary purity of the raw materials. The design of the present plant is similar to conventional silver catalyst plants. A number of refinements designed to improve the yield and reduce the overall consumption of utilities have been incorporated.

Air Purification

Air is drawn first through a nylon filter, then through an electrostatic precipitator before being blown by a centrifugal blower through a bubble cup column round which methanol is circulated. The air is thus cleared to prevent poisoning of the catalyst and substantially dried to prevent dilution of the methanol in the vaporizer, through which it is then bubbled. The rate of production of the plant is determined by the rate of flow of air which is automatically controlled.

Methanol is pumped from storage into a steam-heated mild steel vaporizer, the level of methanol in which is kept constant by a level controller. The temperature of the methanol is automatically controlled and determines the methanol/air ratio which in turn determines the catalyst bed temperature. The mixture of methanol vapour and air is superheated and mixed with an automatically controlled quantity of clean filtered steam.

A close check on the product is made at all stages of manufacture and the testing laboratories shown above play an essential part in product control

The methanol-air-steam mixture then passes through a flame trap into the converter where it passes downwards through the catalyst bed, consisting of a shallow layer of silver crystals spread on a copper gauze, the operating temperature being in the region of 600-650°C.

The hot gases from the converter are immediately quenched in a vapour cooler which is fed with condensate and which generates steam at 30psi. Enough steam is generated to supply the process requirements.

Economy on Steam

From the vapour cooler the gases pass through a condenser having stainless steel tubes filled with earthenware rings. The temperature of the cooling water from the condenser is automatically controlled and this water circulates through a heat exchanger in the vaporizer and thereby effects a useful economy in the consumption of steam.

Uncondensed gases from the condenser are led to the bottom of a bubble cap scrubber, each tray in which is provided with water cooling coils. Liquid product from the condenser is fed to the scrubber on the third tray from the bottom. Surmounting the plate scrubber is a packed scrubber through which the gases pass to atmosphere. A controlled flow of water is pumped to the top of this scrubber which consists of two sections, part of the liquor in each section being continuously recycled.

From the bottom of the plate scrubber the product is pumped to product tanks mounted on weighing machines, where it is blended and adjusted to strength before being pumped away to final storage. Storage for 400 tons of formaldehyde is provided in two reinforced concrete tanks lined with acid resisting brick. From this storage formaldehyde is distributed to the moulding powder and resin factories by stainless steel pipelines.

All the controlling and recording instruments, together with the pump switches, are mounted on an instrument panel in the central control room from which the plant is operated. Adjacent to this is a small laboratory in which the routine testing is carried out by the plant operator.

The mixing floor at BIP chemicals No. 3 factory where the urea formaldehyde syrup and the cellulose pulp are mixed—one of the first operations in the manufacture of moulding powders

Blackley Construction

A £85,000 contract has been awarded to A. Monk and Co. for carrying out the civil engineering and building work for a new plant building, offices, and laboratory at the Blackley Works of I.C.I., Dyestuffs Division, Manchester.

Electrical Aids in Industry—Data Sheet **19**

Factory Heating—2

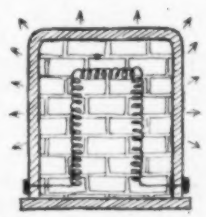
It is impossible in this Data Sheet to describe in detail every type of electric heater on the market, but a representative selection is dealt with below. Each type of building presents its own problem, and the best plan is to seek advice from your Electricity Board, who will be pleased to help.

'OFF PEAK' ELECTRIC HEATING

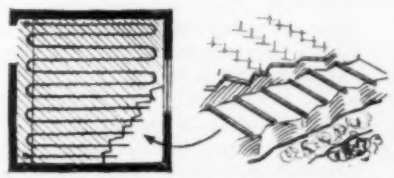
Because the 'off peak' load makes use of generating and distributing equipment when it would otherwise be idle or underloaded, it is attractive to the Electricity Boards, who offer cheap 'off peak' tariffs. Three types of 'off peak' heating systems are available, namely:

(a) Hot water storage heating: This consists of a conventional hot water radiator or panel heating system through which hot water from a large storage vessel is circulated. The water in the storage vessel is heated electrically during the 'off peak', low tariff hours and is circulated when required through the radiators or panels.

(b) Block storage heaters: These heaters consist essentially of a number of firebrick blocks which are heated up during the 'off peak' hours by means of suitable electric heating elements. The storage heaters are clad with a layer of suitable heat-insulating material and are housed in a sheet metal casing, the design being such that the stored heat is gradually dissipated throughout the day by means of radiation and convection from the casing. The great advantage of this method is that these heaters can easily be installed in existing buildings.



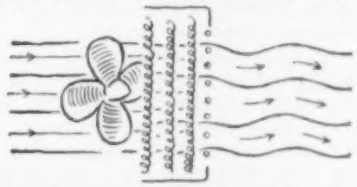
(c) Floor warming: In an 'off peak' floor warming installation, electric heating cables or ducts housing withdrawable cables are embedded in the concrete floor of the building. The cables are switched on and the floor is heated up during the 'off peak' hours, and the mass of concrete and screed of the finished floor has sufficient thermal storage capacity to heat the building during the period when current is not available. This method is only applicable to new buildings or buildings where new floors are being constructed.



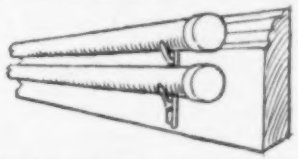
Plan view of room — Isometric view of heating cable

DIRECT ELECTRIC HEATING

(a) Unit heaters: These consist of a bank of electric heating elements fixed in a casing on which is mounted a fan which draws or blows air over the heating elements and discharges it, usually through adjustable louvres, in the required direction. A number of such units are mounted on the walls or stanchions or hung from the roof members in appropriate positions throughout the works.



(b) Infra-red heaters: These consist of heating elements usually of the sheathed metal or silica tube type mounted in a polished reflector. They operate at temperatures from 700 to 900°C, and give off the greater part of their heat output by radiation. They are mounted overhead in a similar way to unit heaters and are particularly useful for providing local areas of comfort in spaces not otherwise heated.

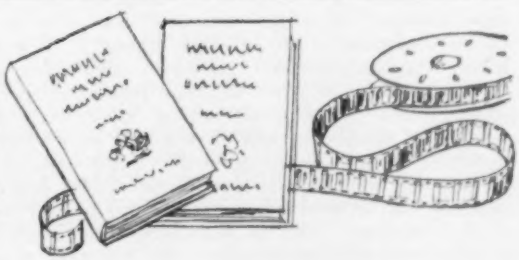


(c) Tubular heaters: These, as the name suggests, take the form of tubes approximately 2" in diameter containing an electric heating element and are available in lengths from 2 to 17 ft. The normal loading is 60 watts per foot run and the surface temperature is from 180 to 200°F. They are usually placed round the walls at skirting level, but also can be used at high level in order to prevent downdraughts from windows and skylights.

For further information get in touch with your Electricity Board or write direct to the Electrical Development Association, 2 Savoy Hill, London, W.C.2. Telephone: TEMple Bar 9434.

Excellent reference books on the industrial and commercial uses of electricity and reprints of articles and papers are available.

E.D.A. have available on free loan in the U.K. a series of films on the industrial uses of electricity. Film and Book Catalogues and Publications List sent on request.



CUT HERE

VIEWS and REVIEWS

Plastics and Personality

PROFESSOR GEOFFREY GEE gave the Swinburne Lecture to the Plastics Institute in February and it is printed in the *Transactions of the PI* for April 1961, Vol. 29, No. 80, pp. 32-8. Although rather prosaically entitled 'Plastics in Theory and Practice', it is marked by that individuality of style that we have come to expect from Professor Gee's lectures. Lectures? One of the striking things about them, to which this one was no exception, is their informality, so that they might be well-called 'talks' or even 'chats'. And this can be said without detracting from their technical importance.

In this lecture he combined, into a new exposition of an old theme, a general survey of the field with some of the recent work of his own Chemistry Department at Manchester University. He is deceptively casual, setting off in a sentence or a phrase a complex scientific idea, so that we think we understand if only because we have no difficulty in following him.

He also disarms intentionally. Ostensibly out to discuss the dependence on chemical structure of certain physical and processing properties, right at the beginning of his lecture he says: 'I therefore make no apology for the fact that my discussion is unbalanced, my comments on practice very theoretical, and my selection of theory strongly coloured by my own interests and experience'.

We have plenty of other people who can write the orthodox (and valuable) paper, competently and completely. But, let us be thankful that in addition we have the individual approach.

Viscosity of Polymer Solution

Professor Gee is in the historical tradition of classical science expositors who handle words with precision and simplicity. To prove this, I need do no more than quote one paragraph from the lecture.

'Even a dilute solution of a really high polymer is quite viscous and the study of this property has taught us a good deal about the dimensions of polymer molecules. Owing to the relative freedom of rotation about single bonds in its backbone, a linear polymer takes up a more or less crumpled configuration in which the distance between the chain ends is only a small fraction of the length measured along the molecule. The molecule constantly changes its shape, because of thermal motion, but its average overall shape is roughly spherical, with a large amount of space, among the convolutions of the chain, filled with solvent molecules. The overall size can be measured, and is found to be greatest in a good solvent, diminishing markedly on addition of a proportion of precipitant. The viscosity is found to vary in the same sense as the overall size, and this gives the key to the explanation of the high viscosity. When the solution is being sheared, opposite "sides" of a single molecule will be in layers of liquid moving relatively to one another. For a given rate of shear, the relative velocity of these tangential layers will be proportional to the "diameter" of the molecule. If the molecule can be regarded as essentially a solid, the viscous force, and therefore the observed viscosity, will also be proportional to the diameter. This is essentially what is observed at sufficiently low concentrations and low rates of shear. A highly branched molecule must necessarily take up a more compact form than a linear molecule under comparable conditions. It is therefore in accord with expectation that branched polymers are observed to have lower solution viscosities than unbranched polymers of the same average molecular weight'.

Design for Making

Recent prize-winning designs for manufactured articles have been subjected to considerable criticism, mainly for functional reasons. It might be well to point out that design, which used to have two major aims and considerations — function and acceptability in appearance — now has a third: suitability for mass production, if not automation.

Both utility and appearance can be discerned in the product itself by the ordinary, ultimate consumer (although he is sometimes held not to be particularly adept at knowing what he ought to like), but it needs an expert, perhaps a specialist, to determine, simply by looking at the product, whether it is suited for automated mass production. In fact, in many industries, a new conception of product design has arisen: does it lend itself to automation?

Although such an approach is most obvious in the manufacture of those fabricated, constructed articles which have been made possible on the large scale by mass production, such as the motor car and the radio set, the same principle applies to the methods of processing, and therefore the products, of the chemical industry, of which, in the last analysis, our industry is a part. Does this not mean that our technical development staffs are now all designers — process designers?

It is obvious that automation necessitates an increased proportion of technologists, particularly engineers, as part of the production system but they are also demanded by the impact of automation on the commercial system, and not merely because that system itself is now using complex electronic devices for calculating, integrating, and prophesying.

It is of little value to design a process for making a valueless product, *i.e.* one which cannot be sold. Therefore it is important that development technologists, engineers, physicists, chemists, be given an all-round view of the business they are serving and especially brought intimately into contact with the commercial aspects of the company, mainly selling and markets, if their technical capabilities are to be used to the best advantage.

It may even be that growing automation will bring with it increasing employment of technologists in the higher flights of executive management, a trend which would be the reverse of what has been happening for some years now. In a future in which the technology of production is likely to be predominant, the place of design in the complex of materials, processes, products, and selling may be decisive. It is likely to be understood better by a technologist than by anyone.

Ultrasonic Sealing

A machine made by International Ultrasonics Inc. is described in *Plastics Technology* for March 1961, Vol. 7,

COMMENT ON SCIENTIFIC AND INDUSTRIAL MATTERS

by **F. C. JENNINGS**

No. 3, pp. 58-9, which, by ultrasonic energy, makes either spot or seam lap joints in plastics. It can be used for some thermosetting materials as well as thermoplastics, and similar or dissimilar plastics can be joined together or to textiles, paper, and so on.

It is a cold jointing method applicable to films up to 20 mils thick. Lap joints are essential but a technique has been developed of close mechanical control whereby the joint can be thinned down during formation until it is of the same thickness as the adjoining single sheets.

It is claimed that the film does not need a preliminary cleaning as 'intervening coatings such as metallized layers, photographic emulsions, powders, liquids (water and mineral oil) . . . do not become embedded in the seam but are displaced by the HF vibrations and extruded out the sides of the seam'.

The oscillating circuit is shown in a diagram. Important features of it are that a matching transformer couples the power to a lead zirconate titanate transducer, and a feedback signal from the welding array, through an automatic frequency control applied to the tuning condenser, keeps the oscillator tuned to resonance.

Cellular Plastics

If you are interested in the subject of cellular plastics, but are neither a novice nor an expert, the recently published paper by A. Cooper of Expanded Plastics Ltd. is just what you require. It appeared in the *Transactions of the Plastics Institute* for April 1961, Vol. 29, No. 80, pp. 39-52, and is 14 pages of the competent, complete, considered writing which we have come to expect from Mr Cooper. I know of no person who has made such an important personal contribution over the years in this field as Mr Cooper and this latest paper, 'New Developments in Cellular Plastics', read before the Midland Section of the PI last November, is one of his best.

The paper deserves more space than I can give it here. These are some of the matters he discusses: expanded ebonite's unique suitability for low temperature applications, and its excellent ageing resistance (no deterioration whatever in over 40 years); rigid foams — urea-formaldehyde, phenol-formaldehyde, polyurethane (illustrations of portable, continuous-foaming machines); flexible polyurethane foams (one-shot mouldings); pvc foam ('Elastomer process'); expanded polystyrene, cellular polythene, expanded polypropylene; expanded Hypalon (photomicrographs); expanded polyamides and fluoro compounds.

In the discussion on this paper when it was read (now printed on pages 52-4) interesting points raised included: possible effects of the gas pressure inside the cellulose, relationships between conductivity and density and cell-size, and effects of reaction rates on the physical properties of flexible urethane foams.

Blowers and Fillers

Cellular plastics technologists may like to have their attention drawn to a 'built-in blower' advertised in *Rubber Age* for January 1961, Vol. 88, No. 4, p. 694, by C. P. Hall Co. It says: 'Magcarb W, water donor magnesium carbonate, has been used successfully as an activator for Hypalon cures and as a blowing agent for various sponge rubber compounds. Among suggested applications are its use as a blowing agent for polyurethanes. . . . Magcarb W decomposes upon heating in a series of steps with evolution of steam and carbon dioxide. The reaction depends upon time, pressure, and temperature. . . . It is a clean, white odourless powder . . .'

It is, of course, quite likely that there are other cheap substances with available H_2O which can be used to react with isocyanates to produce CO_2 and to build into the urethane compound.

A filler for polystyrene may also prove useful for the cellular form. Wollastonite, a naturally occurring form of calcium metasilicate, is claimed to be a good extender for solid polystyrene. The evidence presented in an article on pp. 49-50 of *Plastics Technology* for March 1961 shows that up to 30% has no essentially degrading effect. Its sg is 2.9 and its US cost under 2½ cents per lb.

The material mixes easily and readily into polystyrene on a mill or in a Banbury but, for some purposes, even less mixing is required; for instance, a dry mixture of wollastonite and powdered polystyrene can be fed directly into an injection moulding machine, if gloss uniformity and surface homogeneity are not vital.

Despite the sg figure, the addition of 30% gives a volume saving of over 9% in cost.

Cellular Concrete Using Cellular Polystyrene

Building Engineer K. Köhling and Chemical Engineer R. Petri, of BASF, report in a recent issue of *Kunststoffe*, a method of making cellular concrete, by incorporating particles of a cellular polystyrene, and reinforcing with a plastics dispersion.

A simple mixture of cellular polystyrene particles (1 to 10mm.) into the cement, with or without sand or aggregate, does not affect the pouring or moulding properties and raises the moisture resistance and hence the insulating properties. The mechanical properties of the resulting concrete can be improved by incorporating an aqueous disperson of 'Propiofan,' which is a polymerized or copolymerized vinyl propionate without plasticizer. Such a light building material has excellent adhesion to the rigid underlay and a high resistance to pressure and bending. Epoxy and ethoxy resins in aqueous dispersion are also useful additives.

Heat Conductivity

'Heat Conduction in an Expanding Material' by R. H. Norman of RAPRA is a theoretical paper appearing in the *Transactions of the IRI* for February 1961, Vol. 37, No. 1, pp. 30-4, showing how the temperature distribution in a uniform sheet of rubber being expanded by heat may be calculated. The author discusses earlier formulas for obtaining the conductivity value of cellular rubbers and rightly criticizes some because of false assumptions, and suggests a simplified equation which he shows to give somewhat low results but to be, generally speaking, an adequate approximation. He is especially severe and plainly right on the equation of Sandomirski in *Kauchuk i Rezina* 1959.

CHARLES JENNINGS

MEN *and* MATTERS

A Review of People and Events

by Peter Richards

THE recent retirement of Dr Ray P. Dinsmore, vice-president of Goodyear's research and development, and one of the most celebrated men in rubber research today, came two months before his 47th anniversary with the company.

When Dr Dinsmore first took over direction of Goodyear's research activities in 1921, the company was primarily a manufacturer of tyres and industrial products. He has seen diversification into synthetic rubber, plastics, chemicals, aviation products, films, flooring, foams and shoe products. All were initiated and developed under Dr Dinsmore's guidance.

His leadership in tyre research resulted in such industry milestones as the first rayon cord tyre, and he served as assistant US deputy rubber director during World War II, organizing and directing synthetic rubber research and development and co-ordinating activities of both industrial and university laboratories.

In recognition of his work in synthetic rubber research, he was awarded the Colwyn Gold Medal for 1947 by the Institution of the Rubber Industry, and the Charles Goodyear Medal for 1955 by the American Chemical Society's Rubber Division.

Someone like Dr Dinsmore can never really retire from his subject; and in fact he will continue to advise Goodyear on research and development projects on a consultant basis.

Banding Together

The humble elastic band has acquired a new status. A cosmetic company in America is snapping giant rubber bands around the top layer of cartons stacked on pallets to hold it in position when the pallets are moved.

The bands, made by B. F. Goodrich, are up to 1½in. wide, 6ft. long, and can be stretched up to 18ft. The cosmetic company previously used an adhesive tape which took some time to apply and often ripped the cartons when it was removed. The rubber bands are expected to last for three years, giving a total saving of $1,200 a year.

Three in One

The Vickers Vanguard contains a novel type of unit construction: a combined heating, ventilation and sound insulation unit incorporating Terylene ducting. The success of the construction depends largely on the fabric used for the ducts. It has to possess a high strength to weight ratio and low stretch properties under tension, to be non-absorbent, airtight and fire resistant and to endure a temperature range from −40°C.—120°C. A pvc coated 1½oz. Terylene fabric was found to meet these requirements.

A feature of the system is that it is possible to remove easily from an aircraft the main cabin wall lining and the combined air ducting and insulation units.

Image of a Company

The second issue of *London Image* — the house magazine of the London Rubber Co. group — reflects a company that is growing rapidly. With the recent take-over of the J. Allen Rubber Co., the group has become one of the biggest producers of house gloves in the world.

'This is not to suggest', says managing director A. R. Reid in a foreword, 'that we have some kind of favoured monopoly position. Far from it — competition is extremely keen as there are quite a number of other UK manufacturers fighting hard for a share of the trade, as well as competition from overseas, particularly from France and Australia'.

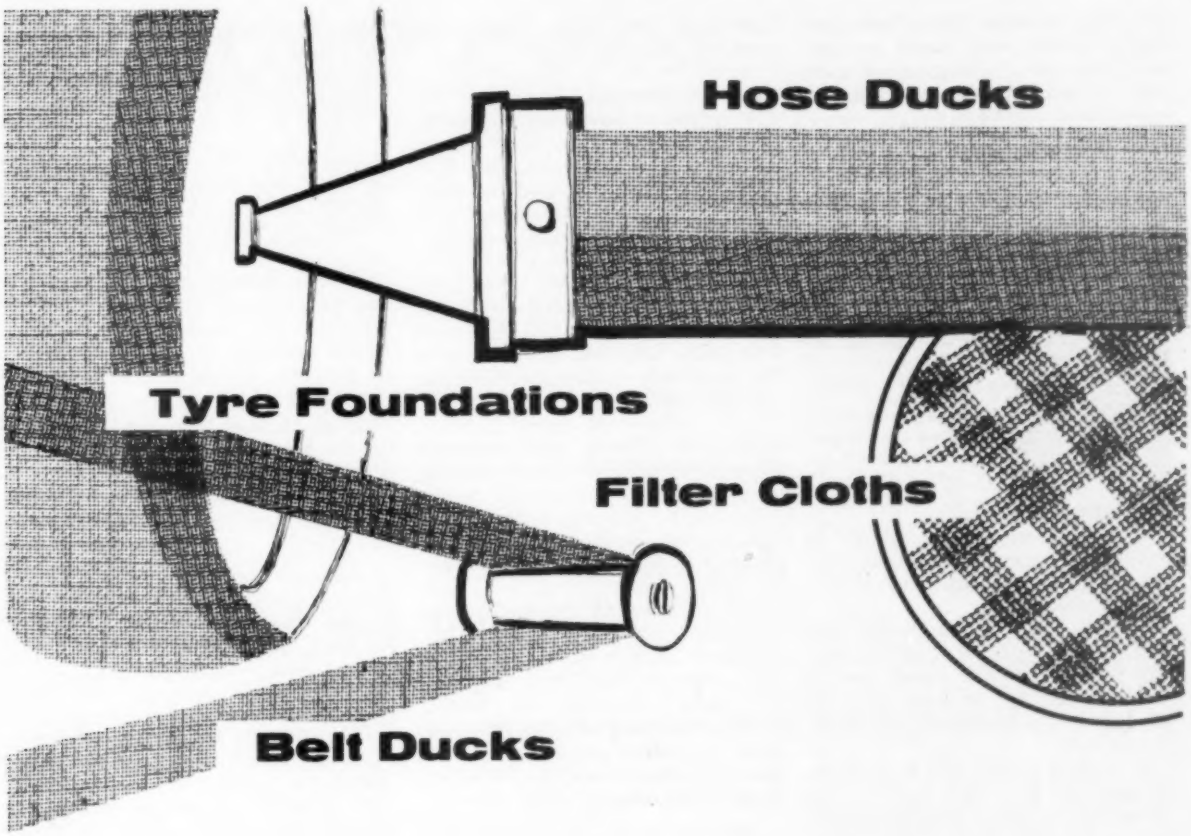
London Rubber itself does not stop at the English Channel. Its vigorous export division is winning an increasing number of orders from overseas, one of the biggest this year being for 200,000 pairs of house gloves from the Swedish Co-operative Society.

In spite of its expansion — last year London Rubber and J. Allen Rubber accounted for 6% of the total UK exports of manufactured rubber products, excluding tyres — *London Image* shows that the personal touch in the company has not been lost. This house magazine is very well produced; in fact one of my few criticisms is that it is not published often enough. (The magazine is a quarterly.) I know only too well the difficulties of obtaining sufficient material, particularly in the early stages. But continuity is all important and demands at least a monthly publication, even if it means a smaller one.

An Uneasy Appendage

I hope to say more about house magazines in the rubber and plastics industry in a future issue, but this seems a convenient point at which to release a particular bee from my bonnet. If a firm is large enough to need a house organ, then it is large enough to employ a full time, trained editor. All too often this specialized, important job forms an uneasy appendage to the publicity or sales department, and the editor finds him-

Insatiable demand for literature on the I.C.I. stand at the recent British Trade Fair in Moscow



Tyre Foundations **Tarpaulin Canvas & Sail Cloths** **Liner & Wrapper Cloths**
Filter Cloths **Transmission & Conveyor Belting Ducks** **Hose Fabrics**
Boot & Shoe Materials **Protective Clothing**
Fabrics for Rubberising
Plasticising and Laminating Purposes
Printers' Blanket Wigans

Hay & Robertson

Whatever your fabric requirements or problems consult Hay & Robertson at

St. Margaret's Works, Dunfermline
Telephone: Dunfermline 1
Telegrams: 'HAY' Dunfermline
London Office: 74 Cheapside, E.C.2. Tel: CITY 5901

self doing a number of ancillary jobs which no-one else wants to do, instead of concentrating on his main task of bridging the gap between management and staff.

(I would welcome copies of house organs from any editors who do not already send them to RPW).

R. H. Wilson has been appointed a director of Ciba (ARL) Ltd. He has been associated with the development of Araldite epoxy resins and was appointed general sales manager last year

A Change of Air

An interesting use of plastics in building has solved a ventilation problem in a 23-storey high block of flats in Westminster.

Because all the bathrooms and lavatories of the 160 flats in the tower will be placed in the central core of the building, none of them will have windows and so mechanical ventilation is necessary.

A suitable extract system has been designed to give three to five air changes every hour. The system consists of six main vertical ducts rising through the building with connexions to each of the flats. These vertical ducts join into a common main, connecting through silencers to axial flow fans in a plant room at the top of the block.

All the ducting will be completely encased in the brickwork. It has been fabricated from I.C.I.'s rigid pvc sheet by Man Mil Plastics Ltd.

James H. Whittam

I regret to hear that James H. Whittam, a director and works manager of Ebonite Container Co. (Manufacturing) Ltd., died last week.

Mr Whittam was connected with the battery trade for nearly 40 years.

Appointments in Brief

Charles A. Moore has been appointed to the board of US Industries Inc. (GB) Ltd. Mr Moore, who is 51, is already a director of Burtonwood Engineering.

* * *

A. van Beugen Bik, managing director of the RFD Co., Godalming, Surrey, has been elected vice-chairman and A. A. Wylie, FCA, has rejoined the company as joint managing director after a period of absence.

* * *

Roy Ball has been appointed Northern area sales representative of Hubron Rubber Chemicals Ltd., of Failsworth, Manchester.

* * *

W. C. Botkin has been made a vice-president of Dominion Rubber Co. Ltd. He continues as treasurer of the company.

* * *

T. R. Reynolds has joined the outside sales staff of Vinyl Products Ltd. in the South London and Southern England area.

Polly Ester Says...

'Nip roller—Japanese pastry cook'

THE LEGAL ANGLE

Clothing for Safety

By a Barrister

'It is one thing to provide protective equipment and clothing, and quite another to make sure that it is used'. RPW, May 13 1961.

How far, in law, have you fulfilled your duty as an employer when you provide necessary protective clothing? And how far does the law — as opposed to good sense — insist that you should insist that the clothing is used?

It is an employer's duty to provide a safe system of working and all necessary plant and appliances, kept in proper condition. It is an employee's duty to take reasonable care for his own safety. Whenever an accident happens in the factory, you should ask yourself: whose fault was it ? If the true cause of the mishap was defective equipment — then you (or, we hope, your insurers) will be in trouble. If, on the other hand, the real cause of the disaster was some carelessness on the part of your employee, it will be for him to bear the results of his own stupidity or negligence. It may be that the answer falls somewhere in between. You may not have used adequate care; but also the employee was guilty of contributory negligence — his own carelessness, that is, contributed to the accident — so the damages he would recover would be reduced proportionately to his share of the blame.

Now suppose that there is a mishap in a moulding factory. An operative's hands are injured because he failed to wear protective gloves, provided by his company. Who is to blame?

The company provided the gloves, so they are over the first hurdle. But that is not enough. Did they instruct the employee in the necessity of wearing the gloves? Did they pull him up when, on previous occasions, he failed to wear them? Was he adequately supervised in and about his work? Were the gloves readily available for his use? Was he told when and how to wear them — and the dangers of leaving them off?

Before the degree of responsibility of the company can be assessed, all these questions must be answered.

Equally, how senior was the employee? How much was one entitled to leave him without supervision, once he had been provided with proper, protective clothing and adequate plant, machinery and appliances? Was he new to the trade? Could it really be said that he had been negligent — or was the fault really that of his employers?

So no categorical answer can be given to our question, except to say that the mere provision of adequate equipment or protective clothing is unlikely, on its own, to be sufficient to free the employers from any other responsibility. If you want to be safe — and to keep your employees safe — then you should not only provide protective clothing, but do your best to see that it is worn or used. After all, it is only common sense — and the law of negligence is that a person's duty and behaviour is judged by the common sense standard of what an ordinary, reasonable man would do in the circumstances.

IRI FOUNDATION LECTURE 1961 Continued from page 870

position which would have been catastrophic without them. We could not visualize the industry without a certain basic amount of natural rubber. Today the new stereo rubbers — cis 1:4 polyisoprene and the cis 1:4 polybutadiene — have altered the hitherto invulnerable position of natural rubber. It would appear from the weight of technical evidence which is building up that approximately one-half of the present tyre usage of natural rubber can be replaced by polybutadiene. The remainder can be replaced by polyisoprene. This technical evidence will continue to build up month by month, and it will no longer be a question of whether synthetic can be used in place of natural and still retain adequate quality, but simply one of cost.

Main Developments in Processing

Turning to processing, new methods of installing and operating internal mixers have been developed. Even the 'die hards' no longer regard them as massing machines with the mix requiring further mill mixing to obtain the required dispersion or to add the sulphur. They are being operated as complete mixing machines in themselves giving adequate dispersion and without scorch troubles except in the case of the extremely fast curing compounds such as the DV shoe moulding compounds. This change in view mainly coincides with the installation of the internal mixer directly over the mill and the use of rapid batch off and cooling arrangements resulting in the quick removal of dangerous heat from the batch.

Subsequent changes involve faster rotor speeds, higher ram pressures and greater horsepower drives. These, combined with automatic time and temperature control and automatic weighing and feeding systems, have made it into an extremely efficient mixing machine compared with the mill mixer of 30 years ago.

The entire mixing process, however, still smacks of brute force and empiricism. In the case of natural rubber we start off with a beautiful long chain polymer and, because the chains are too long for us to be able to handle it, we proceed to masticate it, *i.e.* to mechanically rupture the chains into shorter pieces hoping that some of the broken ends will unite with any odd molecules of oxygen floating about before they reunite and we have to break them again. Peptizers are a big improvement in that they prevent chain reformation more efficiently, but we still have to use large amounts of energy in degrading the polymer.

Having reduced the rubber to a tractable state by this method we then proceed to employ even more energy in forcing apart the polymer molecules and inserting in between them particles of the various powders we have decided to incorporate. In the process we break even more chains into even shorter pieces. We then proceed to try and rectify our demolition work by cross-linking.

Surely the time is approaching when our mixing will be done more elegantly and without the massive use of disruptive forces on the polymer. It is, of course, the only method we have available at the present time but tiny points of light keep appearing at intervals which may lead to more elegant processes. These pointers are such things as the self-reinforcing polyurethanes and some work on the reinforcing effects of aluminuim hydroxide formed *in situ* in a nitrile latex. Extruders have shown only small changes in design; calenders have been immensely improved for ease of control and accuracy; tyre machines have become more and more automatic and one or two tyre curing departments are in existence which are completely automatic in operation.

Attracting Suitable Technologists

The complete picture shows a dynamic technology which almost daily becomes more complex and one which is expanding at an almost exponential rate. Few technologists require such a wide spectrum of knowledge. An industrial technology such as this can only be used to the best advantage if an adequate supply of trained personnel is available to apply and control it.

We have excellent rubber technology schools and colleges available, which can be expanded, and the real difficulty seems to lie in the lack of our ability to attract a sufficent number of suitable entrants to our schools and colleges. The public and senior independent residential schools could well form an additional source of suitable entrants.

One of the main objectives of such schools is to teach boys how to live together, in a reasonably amicable way, while preparing them for higher education. This would be an excellent basis on which to build a scientific education.

500 Miles of Neoprene

About 500 miles of neoprene-sheathed cable and a total of 3,200 sq. yd. of neoprene-based decking have been used on the liner *Canberra*, now on her maiden voyage to Sydney and San Francisco. The cable was supplied by BICC Ltd., Pirelli General Cable Works Ltd., Standard Telephones and Cables Ltd., and Associated Electrical Industries Ltd.

A multi-layer rubber composition decking covers the promenade deck, the boat decks and various smaller exposed decks, instead of timber planking. The games deck, arena deck, navigating bridge and wheel house top are also covered with neoprene composition.

A meeting of the co-ordinating advisory committee for scientific research (natural rubber) of the Malayan Rubber Fund Board was held last week at the new natural rubber headquarters in Buckingham Street, London, W.C.2. Present were (nearest camera) R. B. Carey, and (moving clockwise), Dr W. E. Cake (vice-president, research and development, US Rubber Co.), Sir Frank Engledow, H. B. Egmont Hake and E. D. Shearn (chairman and vice-chairman of the research and development committee of the Rubber Growers' Association), Sir Eric Rideal, Dr J. G. Mackay (chairman Francis Shaw and Co. Ltd.), Dr Pierre Michaux, W. G. Wrenn (Rubber Research Institute of Malaya), Dr C. C. Webster (Director, RRI Malaya), N. Daniel (Dunlop Rubber Co. Ltd.), E. A. Murphy (Dunlop Rubber Co. Ltd.), Sir Harry Melville, Sir Geoffrey Clay (Controller of Rubber Research MRFB), E. Jago (London representative MRFB), L. Bateman, director of research, NRPRA), Tengku Ja'afar bin al-Marhom Tuanku Abdul Rahman (counsellor and trade commissioner at the Malayan High Commission), P. O. Wickens (Secretary)

COMPANY MEETING

DUNLOP

RUBBER COMPANY LIMITED

RECORD TURNOVER

SIR G. EDWARD BEHARRELL'S SPEECH

THE 62nd annual general meeting of the Dunlop Rubber Co. Ltd. was held on May 29 in London.

Sir G. Edward Beharrell, the chairman, presided and, in the course of his speech said:—

The year 1960 has been one of considerable growth and the volume of goods sold was greater by about 5% when compared with the previous year. Turnover increased from £261m. to a further record figure of £275m. Our sales in the last few months were, of course, affected by the recession in the motor industry in several countries but sales in other directions were well maintained.

The benefit from the increased volume during 1960 went a considerable way towards offsetting the cost increases with which we were faced during the year. Of these the price of rubber was the principal factor — and this is referred to and illustrated in the Directors' Report — but increased labour rates were also important. In total these two items increased our costs, when compared with those of the year before, by several million pounds.

On the other hand, selling prices were not raised to a commensurate degree; but as a result of greater efficiencies and the additional turnover our profit was only slightly lower than in 1959. A noteworthy feature was the fact that the overall profit from our UK operations was 15% higher, and the results achieved by some of our units were considerably better, than in that year.

The overseas results were not so good, and you will have observed from the review of our various activities contained in the Directors' Report that losses were suffered, or profits were lower, in some overseas operations where competitive pressure was particularly severe. In others, however, we showed good progress and our overseas activities continue to account for over half of the Group profit.

In considering our results there is one particular feature to which I would like to draw your attention, and that is the increase, from £7.3m. in 1959 to £8.1m. in 1960, in the provision for depreciation. The greater part of this increase was in respect of plant installed during the year, mainly for modernization but also for expansion. The process of replacement and modernization of plant in the industries in which we are engaged is essential, not only to keep the quality of our products abreast of modern conditions, but also to reduce our production costs, and thus partly to offset the continuing increases in labour and other costs.

With the pressure on margins created by the factors to which I have referred, I feel we did well to achieve a profit only slightly below the 1959 level, although inevitably this resulted in a reduction in our margin of profit in relation to turnover. Likewise, the return on capital employed was somewhat lower, and I have said before that our target must be a good deal higher than around 12% because I consider that we can achieve something better.

Taxation absorbed a higher proportion of our net profit for the reasons already stated in the Directors' Report, and this of course affected our disposable profit. Nevertheless, the Directors consider that the results and prospects justify an increase in the final Dividend from 1s. 2d. to 1s. 3d. per 10s. stock unit, thus making the total dividend for the year 1s. 7d. or 15.5/6%. I hope stockholders will approve their recommendation.

At the same time I would like to point out that in each of the last four years the ordinary dividend has been increased and that, allowing for the bonus issue in 1959 the total rate paid and recommended for 1960 is over 40% higher than the rate paid for 1957, whilst the dividend is still twice covered. I would also like to advise stockholders that the Board has decided that the present disparity between the interim and final payments should be reduced. Therefore, in the absence of unforseen circumstances, the interim dividend for 1961, to be announced in October, will be at a higher rate than in 1960, although this must not be taken to imply a higher distribution in total for the year.

Dunlop in Europe

It would seem that the time of accord between the countries of the Common Market and the Free Trade Association may not be far off. At the very least, the ultimate probability of a grander economic design has ceased to be a flight of fancy. This is the time for the count-down, and for the country and the individual firm we are entering a period when the possible consequences of the alliance should be carefully and urgently considered. We have the chance now to temper our enthusiasm with facts.

For one thing, too much should not be expected too quickly from the larger trading area. Even when tariffs have disappeared and fiscal policies have been suitably related, there is no reason to believe that problems of production and distribution will disperse in a spirit of economic unanimity. Too much, perhaps, is sometimes read into the example of the Iron and Steel Community. I would find it very difficult to visualize, for example, the fast emergence of a single sales policy within Europe for some of our major products even after other discords have been harmonized.

The fact is that very real natural differences exist between countries, and they can be expected to continue beyond the point of economic unity. In our experience we have found significant national distinctions in tastes and outlook; road surfaces and other physical conditions vary quite startlingly between countries; there are noticeable contrasts in the characteristics of the cars and trucks manufactured in Europe; and driving habits are seldom the same.

These differences, and others like them, will disappear in time, of course, but only in time, for the business of getting to grips with them is not always as straightforward as it might seem. As an instance, when something like standardization is being discussed between national groups the spirit of co-operation may be willing but the translation is often weak. As Professor Beloff recently emphasised, the discussion of ideas among nations is not made any easier by the subtle way that words can change in translation.

Opportunity For Growth

It is already obvious that even in its preparatory stage the Common Market, with its blend of idealism and determination, has achieved a character of its own. It possesses a spirit of confidence and enthusiasm which augurs well for the continued growth of the area. Of course, even in a dynamic economy not every company is dynamic, and it would be as well if we all accepted the fact that the closer association of economies makes available the opportunity for growth, not growth itself.

For a number of years, with this thought in mind, your Company has been examining how best it could prepare itself for any eventuality.

Obviously, the divisions and companies within the UK would not necessarily be affected in the same way. For some there would be the excitement of broadening horizons and how best to take advantage of them; for others there would be heightened competition.

In any event each division has been required to study the European market, to consider the modifications that may have to be made in its organization and products to take account of changing conditions, and generally to equip itself for the future challenge. Needless to say, an exercise of this kind, even if primarily directed towards Europe, strengthens a division's effectiveness in other markets as well.

On a smaller scale and in less detail, the French and German companies have reproduced the general pattern of diversification of Dunlop in the UK. The French company, whose factory at Amiens is one of the most advanced tyre manufacturing units in the world, also produces wheels and rims. It is first among French producers of latex and other foam products, and has substantial interests in synthetic rubber manufacture.

The German company, which was rapidly rehabilitated after the war, soon consolidated its position as an important tyre manufacturer. Then it turned its attention to foam products, flooring, and sports goods. More recently chemical products and rubber industrial products are being developed.

There are, then, major Dunlop manufacturing units within the European economic areas. In addition a number of selling companies, a large and long established direct export business to the whole of Europe and an arrangement under which we have tyres manufactured for us in Italy provide the Group with opportunities for full participation in the Common Market and the Free Trade area.

As the growth of these areas accelerates, your Group is in a position to take advantage of them whether they remain apart or come together. It is worth emphasising again, perhaps, that the larger units provide no more than an opportunity for growth. In Dunlop we intend taking that opportunity.

In all this there is the challenge of competition which is too often regarded as a problem for salesmen only. That attitude is not realistic. The smell of competition has to be recognized and understood as much at the laboratory bench as on the shop counter, and especially within the factory itself. No part of an exporting business can contract out of competition: we are all in it.

We regret, therefore, that during the last few years we have experienced a number of unofficial stoppages of work in our factories. The underlying cause of these has been a breakdown in the accepted channels of communication between labour and management. It is neither my wish nor intention to attempt a detailed analysis of the issues involved, but our problem will be more readily understood if I quote from a joint report drawn up by our Chief Personnel Officer and a National Officer of the trade union concerned following one of these disputes. This reads as follows: —

'It is imperative that those who, on both sides, are entrusted with carrying out the provisions of all stages of the procedure, should fully understand the letter and the spirit of it and should be properly trained to take their place in it with confidence'.

We have reason to be proud of our achievements in the realm of industrial relations which stretch back over many years; and it is our intention to do all we can, in the changing circumstances of the day, to play our proper part in this important field.

A great deal of attention has been directed by the Company towards specialized training in first-line management, with particular emphasis on joint consultation and communications, accident prevention, an appreciation of scientific management techniques and the broader aspects of industrial psychology. We aim to give trainee foremen an intensive preliminary course before appointment and to provide established production staff with a re-briefing course every two years.

As I have said on other occasions, it is the Company's policy to fill executive and other senior positions, where possible, by promotion from within. Higher management selection and training arrangements demand regular and careful attention. Each man's needs are different. These efforts have continued to bear fruit and we have gone a long way towards ensuring that our future executives are receiving, in good time, the training and experience which will enable them, in later years, to make maximum use of their potential in the various spheres of activity in which they are likely to be engaged.

Training Overseas

As a world-wide group of companies, we are able to give many of our younger men the benefit of overseas managerial experience in their formative years. Overseas training of this kind is probably the quickest and best way of developing a sense of organizing responsibility, business perspective and self-confidence, provided that the man has already acquired a sound basic knowledge of the products and techniques of the industry.

Our overseas companies, in turn, send a regular stream of their own people on extended visits not only to the UK, but to our other factories and organizations in many parts of the world. Managerial ability is an international asset. By way of illustration, I might mention that two of our most important factories in the UK will each be led by a former member of Dunlop Canada. This movement of people — more often than not with families and personal possessions — over thousands of miles is expensive, but we consider the return in terms of improved operating efficiency well worth the time and money invested.

Foremen and other factory specialists are regularly called upon to spend lengthy spells with our overseas units, often on special processing work, but perhaps more particularly on the commissioning of new factories.

All our efforts in the closely allied fields of labour relations and management training are, of course, part of a process of continuous creation. Success or a change in emphasis is seldom discernible in the short-term and worth while progress requires a great deal of patient effort and skill, together with a proper understanding of human relationships. Good labour relations are easier to destroy than to build up and, in the field of management, the maintenance of continuity requires constant consideration in the light of the varying development of individual personalities.

In my statement in June 1959 I said that so much research had been carried out in the rubber industry throughout the civilized world that for any progress to be made in the current period of development it was essential to delve more deeply into the fundamentals of rubber technology. I stressed that the Company was completely alive to the importance of following such a policy, and was therefore directing a substantial portion of its research capacity to fundamental work of this kind.

I am pleased to be able to say that the results of carrying out this policy are now beginning to show themselves.

One of the main items of fundamental research over the last few years has been meeting the increasing and exacting demands on the vehicle tyre of the future. Much attention has therefore been given to finding out what molecular structure should be built into a synthetic rubber to give a balance of properties between safety and performance. This work has resulted in the production of the first of a new line of 'energy-absorbing' tyres, the 'Elite' tyre, with exceptional anti-skid and braking properties.

The Present Year

In contrast with the early months of 1960, but in accordance with our expectations, the current year started quietly, largely due to the recession in the motor industry which persisted until fairly recently.

For the year as a whole it is too early to say how we shall fare. Like all manufacturers as widely based as we are, we cannot isolate ourselves from the economic conditions of the world's many parts. We are not, however, dissatisfied with the prospects and forecasts of most of our divisions and companies and we have good reason to hope that our current year's results will show further progress.

The report was adopted.

Plantation Newsletter

IRI TRAINING SCHEME FOR MALAYA

FROM KUALA LUMPUR

A TRAINING scheme on production and manufacturing techniques of natural rubber is to be introduced in Malaya. It is to be launched by the Kuala Lumpur branch of the Institution of the Rubber Industry.

Under the scheme, Malayans will be offered part-time courses in rubber technology leading to the diploma of Licentiateship of the IRI. The course will last one year for those in possession of Higher School Certificates and two years for those with Overseas Senior Cambridge qualifications.

The courses will be conducted by members of the Institution and examinations will be held here.

There are today very few rubber technologists in Malaya and previously those who wished to obtain a diploma had to go either to Britain, India or Africa.

Already ten Malayans have signed on for the course and it is hoped eventually to encourage others to attend from neighbouring South-East Asian countries.

Meanwhile the Rubber Research Institute is pushing ahead with its plans for a planters' conference in July, the first one of its type to be held since 1938.

The RRI is aware of the need to acquire knowledge of the outcome of applied research on plantations. In fact, the staff of the RRI sometimes wonder whether reticence on the part of the successful practical planter arises from his feeling that his ideas and experience are not worth bringing to the attention of the Institute.

To counteract this attitude, the Institute has assured successful planters that very fruitful discussions can result from their assistance.

'The pooling of experience of field results can, besides helping to stimulate the progress of research, be of inestimable value to others in the same line of business', it was stated by the RRI.

But how they are to tap this source of information is another problem, and it is for this purpose that the RRI has planned a planters' conference this year.

The purpose of the conference is to give rubber planters the opportunity to present their views and experiences at what might be called ground level, so that there can be full discussion on the observations and ideas which arise under day to day estate conditions.

Tapping and yield stimulation has been chosen as the title for this forthcoming conference and it is hoped that all aspects of this important subject will be covered.

However, the success of the conference will depend on the support it receives from planters.

Gearing Wages to Productivity

The Malayan Planting Industries Employers' Association is not automatically opposed to the payment of higher wages, but it insists that such increases should be matched by increased productivity by the workers.

This was stated in Kuala Lumpur by Mr T. G. Jenkins, president of the MPIEA, speaking at the association's annual meeting. He said that to do otherwise would, in the light of progress made in the synthetic industry, be suicidal and completely contrary to the long-term interests of the workers themselves.

by our Malayan Correspondent

The total area replanted or newly-planted on Malayan estates since the beginning of 1955 was about 510,000 acres, and this figure afforded some indication of the potential increase during the next few years both in total production and in the earnings of tappers through increased yields, he added.

'I feel sure that given the goodwill and mutual understanding of each others problems manifest at the first meeting with the National Union of Plantation Workers, the matters at issue will be satisfactorily resolved when we resume negotiations towards the end of July', said Mr Jenkins.

He made it clear that the problems of the industry were fully and realistically appreciated by the union.

Referring to the industrial tranquility in the country, Mr Jenkins said it had been an uneventful year. It was pleasing to note that there had been a marked reduction both in the number of unofficial one-day strikes and in the number of man-days lost as a result.

'This appears to reflect, and I sincerely hope it does, a growing appreciation by union officials on the ground of the basis of the voluntary system of industrial relations, namely the solution of differences by discussion rather than by resort to industrial action and violence', said Mr Jenkins.

Speaking about the voluntary system of industrial relations which the Government adopted some years ago, he said that this had in great measure been responsible for the steady improvement in industrial relations over the past few years.

Rubber Statistics

MALAYA — WEST GERMANY — NIGERIA

MALAYAN rubber exports in April totalled 55,038 long tons against 76,301 tons in March, according to official statistics released in Kuala Lumpur.

End-March stocks amounted to 67,155 long tons against 81,615 tons at end-February. The end-April figure was 62,455 tons, comprising 40,788 tons in dealers hands, 13,125 tons on estates, and 8,452 tons awaiting shipment.

April production was down at 48,650 long tons against 51,420 tons in March. Imports were 4,480 tons against 5,235 tons. Local consumption during April was 493 tons against 555 in March. Loss in process was 25 tons against 14 tons. Statistical errors and omissions accounted for 2,274 tons.

West Germany

Some 45% of the values of West Germany's production of the rubber and asbestos industries are made into tyres, the Institute for Economic Research has reported in Munich. About 5% are made into asbestos goods and the rest go into various soft and hard rubber goods, the Institute added. In the last five years, the supply of rubber tyres had more than doubled in West Germany, the report indicated.

Rubber tyre production during March again reached a high level with 21,012 tons compared with 19,138 tons in February and 21,760 tons in March of last year, according to the Federal Bureau of Statistics. Production in the first three months of this year totalled 58,794 tons.

Output of other hard and soft rubber goods during March amounted to 26,956 tons against 25,895 tons in February and 26,279 tons in March of last year. In the first three months of this year it totalled 79,134 tons against 71,211 tons in the corresponding period of last year.

Imports of natural rubber and rubber sole crepe in February totalled 9,248 tons, including 5,213 tons from Malaya, 953 tons from Thailand and 767 tons from Nigeria. In the first two months of this year, imports totalled 18,698 tons, including 10,951 tons from Malaya, 1,863 tons from Thailand, and 1,538 tons from Nigeria.

Imports of synthetic rubber during February totalled 4,476 tons including 2,606 tons from the USA, 1,099 tons from Canada and 323 tons from Italy. In the first two months of this year imports totalled 8,298 tons including 5,329 tons from the USA, 1,742 tons from Canada and 531 tons from Italy.

Nigeria

Nigeria exported 2,456 tons of rubber in January this year against 2,769 tons in December and 3,589 in January 1960.

Rubber and Plastics Stock Market

A REVIEW OF PRICES AND TRENDS

IT had to happen. After five months of rise-and-shine boom, share prices have run into a stormy patch. Last week, in fact, was the worst for investors since very early in the year, and newcomers to the investment world found out that things can go down just as fast as they go up. By the 3.30 close of business on the Friday the *Financial Times* industrial index showed a fall of 14.3 points on the week. Many of the 'blue-chip' leaders took a sharp toss as a result of some small but widespread profit-taking. Jobbers, of course, were delighted, for after having been caught badly short of stock for five months or so, they were at last given the opportunity to get some back on their books. And the reason for the sudden break in trend? First, it was becoming increasingly obvious to one and all that the market was long overdue for some kind of technical adjustment. Many positions were grossly overbought with many people just buying blind because of the boomlike fever that existed in places. More important was the growing number of widespread reports from company chairmen warning shareholders of the current strains being felt on profit margins. There are a few who have quite rightly been downright frank and have warned that profits this year will perhaps not match those of 1960. But despite the tumble there is no reason for any worry. Things are not bad enough to go liquid yet. The *FT* index has got to fall something like another 30 odd points if anyone wants to cash in now and make it a profitable occasion. But I ask you, who is there among the experts who at this present moment is prepared to stick his neck out with just such a forecast? Take no notice of the shake-out. Such events can only lead to more healthy conditions in the long run. All things being equal I still consider that there are plenty of more profits to be made.

Good half-time report from my old favourite TURNER AND NEWALL. Active trading conditions were experienced during the first half of the group's trading year and the aggregate profit of the manufacturing companies was a little higher than in the same period a year ago. BRITISH INDUSTRIAL PLASTICS which became an offshoot during the time under review, has also experienced active trading conditions. But though turnover shows only small change, profits were at a slightly lower level. The interim dividend has been stepped up to 4% from equal to 2½%, but the directors pointed out that the increase is only to reduce the disparity

Continued on page 887

Share Price Movements

Par Value	Company	1961 High	Low	May 27	Latest
£1	A.E. Ind. Ord.	48/6	40/3	43/3	41/6
5/-	Albright & W. Ord.	29/6	26/3	27/6	26/9
£1	„ „ „ 5% Pref.	17/3	14/6	14/6	14/9
5/-	Anchor Chemical Ord.	25/6	16/-	25/-	23/9
4/-	Airfix	52/6	34/6	50/9	48/3
4/-	„ Non Voting	50/-	33/6	48/3	47/3
5/-	Andersons Rub. Ord.	—	—	3/9	3/9
£1	Angus Geo. Ord.	83/-	58/6	82/6	77/-
5/-	Ault & Wiborg Ord.	33/9	25/9	30/-	32/6
£1	Avon India Rubber Ord.	46/6	30/-	38/3	38/3
£1	„ „ „ 6% Pref.	19/3	18/-	18/9	18/9
10/-	Bakelite Ord.	66/3	42/3	63/9	58/9
£1	„ 6% Pref.	19/3	16/6	17/6	17/6
£1	Baker Perkins Ord.	59/6	40/6	58/-	56/9
4/-	Bank Bdg. Rubber Ord.	3/6	1/9	2/6	2/6
4/-	Bettix	11/9	7/6	11/-	10/9
4/-	Brammer H. Ord.	17/-	15/9	16/-	15/9
10/-	Bridge, David Ord.	60/-	46/9	58/6	51/-
5/-	Bright, John Ord.	18/9	13/9	18/7½	17/3
5/-	Brit. Blting & Asb. Ord.	24/-	17/6	23/6	22/9
£1	„ „ „ „ Pref.	—	—	15/9	15/9
5/-	British Electronic Indus.	15/6	12/-	13/6	12/-
2/-	Brit. Ind. Plas. Ord.	14/-	7/9	14/-	14/-
2/-	„ 10% (tax free) Pref.	9/9	4/3	9/9	9/9
£1	British Xylonite Ord.	93/-	63/-	93/-	93/-
£1	„ „ 5% Pref.	18/9	14/-	15/-	15/-
£1	BICC Ord.	62/-	50/3	58/-	58/9
5/-	BTR Ind. Ord.	19/9	13/6	17/9	16/6
£1	„ „ 7½% Pref.	21/6	20/9	21/3	21/3
£1	Courtaulds Ord.	47/6	39/6	43/-	41/6
£1	„ 5% 1st Pref.	16/-	14/9	15/6	15/6
£1	„ 6% 2nd Pref.	18/3	16/9	17/6	17/9
4/-	Cow, P. B. Ord.	10/6	7/6	10/3	10/3
£1	„ „ 5% Pref.	14/3	13/3	13/6	13/6
1/-	Dannimac Mfg. Ord.	15/3	12/-	15/-	14/9
10/-	De La Rue Ord.	70/-	56/-	66/3	63/6
£1	„ „ „ 3½% Pref.	10/6	9/6	9/6	10/-
10/-	Distillers Co. Ord.	42/3	30/-	40/3	37/6
£1	„ „ 6% Pref.	20/3	18/3	18/9	18/9
£100	„ 5% Conv. Loan	£96	£91	£92½	£92½
£100	„ 5½% Unsec. Loan	£86½	£80½	£80½	£80½
10/-	Dunlop Rubber Ord.	29/-	21/6	27/6	26/3
£1	„ „ 5½% Pref.	16/-	15/-	15/9	16/-
£100	„ 3½% 1st Debs.	£69	£67	£69	£69
£100	„ 4½% 2nd Debs.	£79	£76	£79	£79
£1	Eng. Elect. Ord.	40/6	32/3	35/6	34/6
4/-	Ebonite Cont. Ord.	8/6	7/-	7/9	6/6
£1	English China Clays Ord.	117/6	80/-	115/-	110/3
£1	Goodyear Tyre 4% Pref.	11/6	10/9	11/3	11/3
5/-	Greeff Chem. Ord.	37/6	22/9	36/6	33/9
10/-	Greeff Chem. 5½% Pref.	8/3	7/6	7/6	7/6
4/-	Greengate & Irwell Ord.	6/9	5/-	6/9	6/6
5/-	Hackbridge Hldg.	6/9	4/9	5/9	5/6
£1	Harrisons & Crosfield Dd.	57/6	48/9	55/-	54/6
1/-	Hunt & Moscrop Ord.	2/3	1/3	1/9	1/9
£1	Imp. Chem. Ord.	81/6	63/-	78/3	74/9
£1	„ „ 5% Pref.	16/3	14/9	16/-	15/6
£100	„ 4½% Unsec. Loan	£83	£78	£81½	£81
£100	„ 5½% Conv. Loan	£93	£87	£91	£91
1/-	Kleemann (O. & M.) Ord.	21/3	8/3	19/9	18/9
£1	„ 6½% Pref.	22/3	16/3	16/9	22/3
5/-	Laporte Ind. Ord.	30/9	24/-	28/9	28/-
£1	„ „ 7½% Pref.	23/-	21/3	21/3	21/3
£1	Leyland & Birm. Rubber Ord.	59/3	46/3	57/9	56/-
£1	„ „ „ 6% Pref.	18/9	17/6	17/6	17/6
2/-	London Rubber	15/-	9/6	14/9	15/-
£1	„ 6% Red. Cum. Pref.	20/-	17/6	17/6	17/6
£1	McKechnie Bros. Ord.	64/6	53/6	63/9	63/9
£1	„ „ 'A' Ord.	67/6	52/6	63/9	67/-
£1	„ „ 6% Cum. Pref.	18/-	16/-	17/-	17/-
5/-	Monsanto Chem. Ord.	27/6	22/-	23/9	22/-
£1	„ „ 3½% Pref.	12/6	11/6	12/-	12/-
£100	„ „ 6% Debs.	£98	£95½	£95½	£95½
5/-	Miles (H.G.) Hldgs. Ord.	7/9	7/-	7/6	7/6
2/-	Movitex	—	—	6/9	6/3
£1	North British Rubber	21/3	13/9	14/-	14/6
5/-	Northwestern Rubber	13/-	9/-	12/-	12/-
5/-	Plastic Enginrs. Ord.	39/3	28/6	37/6	39/3
10/-	Projectile & Eng. Ord.	50/6	22/6	47/6	45/3
5/-	Redfern Holdings Ord.	3/9	2/9	3/-	3/-
2/-	RFD Ltd. Ord.	6/3	3/6	6/-	5/9
£1	„ „ 5½% Pref.	15/-	12/6	14/6	12/6
2/-	Rubber Imp. Ord.	6/3	3/3	3/9	3/9
2/-	„ „ 'A' Ord.	5/-	2/9	3/3	3/-
£1	„ „ 5% 1st Pref.	13/3	11/3	12/3	12/3
5/-	Rubber Reg. Ord.	18/3	16/9	18/-	18/-
4/-	Shaw Francis Ord.	24/6	18/9	23/-	19/6
2/-	Silentbloc Ord.	10/6	8/3	10/3	9/9
5/-	Storey Bros.	46/-	35/-	42/6	41/6
2/-	Sussex Rubber Ord.	2/7½	1/9	2/3	2/-
5/-	Sutcliffe Speak Ord.	18/6	13/6	18/6	18/6
£1	Tootals	35/6	28/-	34/9	33/6
£1	Turner & Newall Ord.	78/-	55/-	68/6	69/-
£1	„ „ „ 7% Pref.	21/6	20/9	21/3	21/3
5/-	Universal Asbestos Ord.	27/-	21/3	25/-	25/-
5/-	Viscose Dev. Ord.	16/3	13/3	15/6	15/9
5/-	Warne W. (Holdgs.) Ord.	21/6	14/9	20/6	21/3

LAMP BLACK

Approved RUBBER grade

IN POWDER OR PELLET FORM FROM STOCK

Used in the Rubber Industry for many years this black is noted for good dispersion and uniformity.

Grit tests show less than 0.004% on 300 mesh particle size 80-100 millimicrons.

CHARACTERISTICS APPROXIMATE TO AN SRF BLACK

WITCO CHEMICAL CO., LTD.

Head Office: **BUSH HOUSE, ALDWYCH, LONDON, W.C.2**

Telephone: TEMple Bar 6473/6476

PEARL HOUSE, PRINCESS ST., MANCHESTER 2 (Central 9066/8) 62 ROBERTSON ST., GLASGOW, C.2 (City 3493)

FACTORIES, LABORATORIES AND SALES OFFICES—

U.S.A. · CANADA · GT. BRITAIN · FRANCE · HOLLAND

H. MUEHLSTEIN & CO./LONDON/ LTD.,

THAVIES INN HOUSE, 3-4, HOLBORN CIRCUS, E.C.1.
Telephone: FLEET STREET 6976
Cables: MOLEBERT, LONDON.
Telex No. 2-3551.
An Associate of H. MUEHLSTEIN & CO. INC.
521, Fifth Avenue, N.Y. 17, New York

Rubber Markets

LONDON

A rather quiet trading period was experienced in London rubber during the week ending June 7. Prices showed minor movements at various stages, being dictated by overseas advices, but finished 1d. below last week's levels. The main factor for the downturn, said traders, was a certain amount of Continental selling at mid-week in a basically thin market. Business in the landed positions, although small, was mainly confined to dealer covering at the decline, while at the same time certain trade quarters reported small Continental enquiry for higher grade sheets.

Latest prices are as follows:

No. 1 RSS Spot: 25d.-25⅛d.

Settlement House:
July 25d.-25⅛d.
August 25⅛d.-25¼d.
September 25⅛d.-25¼d.
July/September 25⅛d.-25¼d.
October/December 25¼d.-25⅜d.
January/March 25¼d.-25⅜d.
April/June 25⅜d.-25½d.

No. 1 RSS cif basis ports:
June 24⅞d.-25d.
July 24⅞d.-25⅛d.
August 24⅞d.-25⅛d.

Godown:
June 84⅛ Straits cents nominal.

LATEX

Centrifuged 60% latex per gallon in drums, seller, August, 14s. 5d., cif European ports. Spot, seller, 15s. Bulk, seller, d.w. 14s. 5d. Creamed, seller, 14s. 2d. nominal. Normal, seller, August, 11s. 9d.

SINGAPORE

In view of a further denial by official sources of any proposed changes in US stockpile policy, the market opened higher on June 5 and fluctuated within very narrow limits. The turnover was small. Lower-grade interest was small and selective and the morning session closed on a quiet note. In the afternoon, the market ruled steady on good enquiry for lower sheet, particularly No. 2 RSS. Forwards were freely traded.

	Malayan cents per lb., fob Malayan ports to open ports	
	June 5	Prev. Close
No. 1 RSS, June ..	85⅛–86	85⅛–85⅜
July ..	85⅛–86	85⅛–85⅜
No. 2 RSS, June ..	85⅛–85⅜	84⅞–85⅛
No. 3 RSS, June ..	84⅞–85⅛	84⅝–84⅞
No. 4 RSS, June ..	81⅛–82⅛	81⅛–82⅛
No. 5 RSS, June ..	72⅛–73⅛	72⅛–73⅛
No. 1 RSS, Spot ..	85⅛–86	85 –85⅛
No. 3 blanket thick re-milled crepe, June	71⅛–71⅞	70⅞–71⅞
No. 1 fine pale crepe, June	91⅛–92⅛	91 –92
2x thin brown crepe, June	68⅛–69⅛	68 –69

Tendency: Steady quiet.

The Industries Syndicate quote latex, native produce, 60% centrifugal, packed in rectangular drums, fob, at 168.00d. per gallon.

NEW YORK

The New York rubber market ruled as under on June 5:

DEALERS' PRICES

	US cents per lb., ex-dock	
	June 5	Previous
No. 1 RSS, June ..	30a	30a
July ..	29⅞a	29⅞a
No. 2 RSS, June ..	29⅞a	29⅞a
July ..	29⅞a	29⅞a
No. 3 RSS, June ..	29⅞a	29⅞a
July ..	29⅞a	29⅞a
No. 1 RSS, Spot ..	30⅛a	30⅛a
No. 3 amber blanket crepe, June ..	25½n	25½n

FUTURES—REX CONTRACT

	US cents per lb.	
	June 5	Prev. Close
July ..	29.95b–30.00a	29.90b–30.05a
Sept. ..	29.60b–29.70a	29.60b–29.70a
Nov. ..	29.43–29.41t	29.40b–29.50a
Jan. ..	29.30b–29.39a	29.39t

Sales: 28. Tendency: Steady.

Futures were steady in modest dealings on June 5. Physical rubber was quiet and steady.

AMSTERDAM

The Amsterdam rubber market ruled as under on June 5:

	Guilders per kilo	
No. 1 RMA	June 5	Previous
June	2.35	2.33
July	2.36	2.34
August	2.36	2.34
September ..	2.36	2.34
July/September ..	2.36	2.34
October	2.36	2.34

Sales: Nil. Tone: Quiet.

DJAKARTA

The market ruled quiet through the day. Buyers quoted 32.25 rupiahs per kilo in the morning hours and 32 rupiahs at the closing but sellers were reluctant.

	Rupiahs per kilo	
	June 6	Previous
Spot No. 1 Priok ..	32.25b	33.00n
Spot No. 2 Priok ..	31.25b	32.00b
Spot No. 3 Priok ..	30.25b	31.00b
No. 1 fine pale crepe, spot	29.25b	30.25b

Tendency: Very quiet.

BANGKOK

The price of No. 1 RSS at Bangkok on June 5 was 27.62½ (27.62½) US cents per lb.

CEYLON

The price of No. 1 RSS at Colombo on June 5 was 104 (103) Ceylon cents per lb.

CELLULAR POLYMERS CONFERENCE

In a report on the recent joint IRI/PI conference on expanded rubbers and plastics (*RPW*, May 13, 713) mention was made of the paper on polyurethane foams by J. M. Buist. It has been pointed out that this report omitted to mention the recent development by I.C.I. Ltd. of an improved method for the bonding of most types of fabric to polyurethane flexible foams. This method uses a Daltoflex/Suprasec G adhesive system and produces fabric/foam laminates having supple handle, good drape qualities, air permeability or impermeability as required, and excellent wash and dry-cleaning fastness.

Although the use of certain adhesives and methods of application introduces some stiffness into the fabric, the transfer spreading technique described by Mr Buist does not introduce any stiffness into the finished product. This is because the film is applied in the dry or almost dry state, and does not penetrate either the foam or the fabric.

STOCK MARKET

Continued from page 885

between the two payments that are made.

Shock from COALITE AND CHEMICAL which returned profits down from £935,900 to £852,100, and after a lower tax charge the net surplus stands at £449,100 against last times £501,000. The forecast minimum dividend total of 11% — same — is to be paid.

GREEFF-CHEMICALS HOLDINGS on the other hand was able to produce a slight improvement in the profit showing. The pre-tax profit has advanced from £245,000 to £257,100, and the payment to shareholders has been increased by 1½% to 16½%.

Another company able to pay more is LAPORTE INDUSTRIES, which is paying ½% increase at 10½% on the capital as increased by an issue as part consideration of its HOWARDS AND SONS takeover deal. Trading profit is up to £4,529,900 compared with £4,334,600.

Calls for Tenders

Tyres and Tubes

Tyres and tubes are required by the Headquarters of Allied Land Forces, South Eastern Europe, P.K.527, Izmir, Attn. Purchasing and Contracting Officer, to whom bids should be sent, quoting Bid No. 7-61. The tyres comprise military tread 8 and 10-ply rating and commercial tread 10 and 6-ply rating.

Closing date: June 29 1961 (Ref. ESB/18069/61).

* * *

C. E. Wrangham has retired from the boards of Davy-Ashmore Ltd. and its subsidiaries.

Pre-vulcanised Latex

NATURAL & SYNTHETIC LATEX COMPOUNDS

Reclaim Dispersions

Colour Dispersions

Vulcanising Dispersions

Filler Dispersions

RL

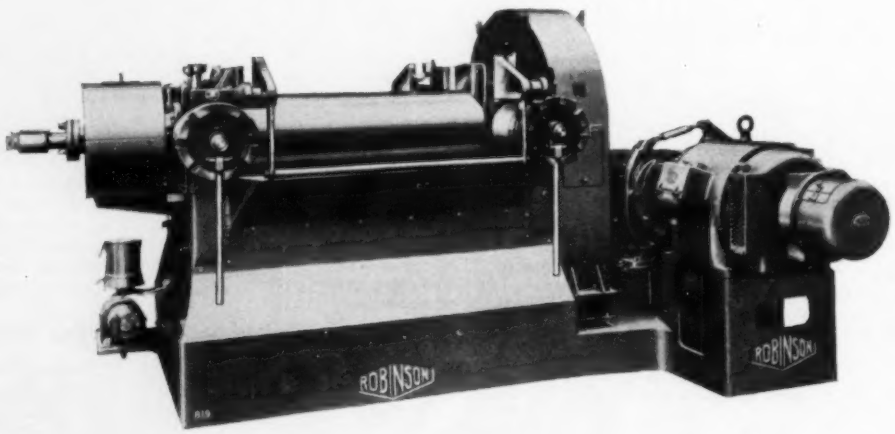
RUBBER LATEX LIMITED

HARLING ROAD, WYTHENSHAWE, MANCHESTER 22.

Telephone: Wythenshawe 3226/7/8. Telegrams: Compounds Manchester

London Office: St. Dunstan's House, Idol Lane, E.C.3. Telephone: Mansion House 1005

RL. 57



16" × 48" S.G. Mixing or Sheeting Mill with 50 H.P. Drive on combined Cast Iron Bedplate mounted on Vibro Insulators.

JOSEPH ROBINSON & CO. LTD. ESTABLISHED 1842

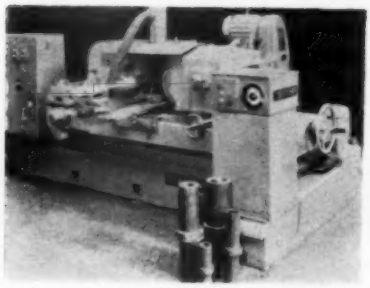
Tel: BLA 1866/7 SPRINGFIELD LANE · SALFORD 3 · LANCS · ENGLAND *'Grams: Opal M/C*

Industry INTELLIGENCE

Machines, Materials and Equipment

Centreless Grinder

The centreless grinding of rubber for washing machine rollers, typewriter rollers, and other similar items, is frequently supposed to be impracticable on account of the elasticity of the material. Rubber pump liners, however, are being currently



ground on the outer diameters and flanges on a centreless grinding machine with special equipment, the largest of which is 6in. diameter by 22in. long, and the stock removal is variable up to .060in.

The machine used is a Scrivener No. 3 centreless grinder, manufactured by Arthur Scrivener Ltd., Tyburn Road, Birmingham 24. In place of the usual workrest and workplate used with this type of machine to support the piece, this latter is in this case mounted on a mandrel and is supported between the grinding and control wheels, the tailstock of this fixture being adjustable to suit the different lengths of piece to be ground. Each piece is ground in three operations, two on the liner outer diameters and one on the diameter of the central flange. The work is ground dry and a suitable dust extractor is fitted to the machine.

Technical Data

Rubber/pvc Blend

Polysar technical report No. 11:4C, issued by Polymer (UK) Ltd., Walbrook House, Walbrook, London E.C.4, describes a compound suitable for the production of high quality, flexible gas tubing for household and laboratory use. This is based on a blend of Polysar Krynac 803, pvc, and a small quantity of Polysar Krylene NS. The Polysar Krylene NS reduces the cost of the compound without appreciably lowering the quality of the tubing. In addition to the cost advantage, this compound produces more flexible tubing than the compound recommended previously for the same application in technical report No. 8:8B.

Other advantages claimed for the compound include: a high degree of impermeability to many gases; very good physical properties and flexibility; flame resistance; white or light colours possible; good weathering and light ageing properties; excellent extrusion properties; resistant to grease, oils and fats. Details of mixing procedure and vulcanizate properties are also given in the report.

Publications

Dry Colouring Guide

Erinoid Ltd. has issued a booklet on dry colourants for polystyrene and polythene. As the extrusion-colouring of the raw materials involves comparatively complex processes, the coloured material has always commanded premium prices. Therefore, advantage should be taken of any satisfactory method of reducing its cost. The dry colouring of polystyrene and polythene reduces these costs by eliminating the extrusion colouring process.

Concise information on the processes involved are given in the publication, which includes sections on the choice of pigments, surface coating, the equipment needed, the techniques to be used, and ends with a page on injection moulding of dry coloured material.

Copies of the booklet and further information can be obtained from Erinoid Ltd., West Halkin House, West Halkin Street, Belgrave Square, S.W.1.

Geon Rigid PVC

Technical Bulletin No. G17, issued recently by British Geon Ltd., Devonshire House, Piccadilly, London, W.1, is called 'Boat Construction in Geon Rigid pvc'.

This outlines the methods by which small boats can be built from rigid pvc by the semi-skilled craftsman, using only the simplest tools. It is claimed that the methods described remove many of the difficulties previously encountered in making boats in plastics materials and result in a boat which is virtually unsinkable.

Details of the principles of construction of boats from conventional and plastics materials are given and the results of tests recently carried out with punts and dinghies made from pvc.

Also included are some details of vacuum forming techniques, solvent welding of pvc and names and addresses of suppliers of the materials referred to in the booklet.

The Common Chemical Market

The New York firm, Foster D. Snell, has published the first directory of chemical companies in the European Common Market and Free Trade Association. Called 'The Common Chemical Market', the directory lists more than 6,000 chemical manufacturers and chemical dealers in the various countries.

In addition to an alphabetical listing of the companies by nation, a special feature of the directory is the first attempt to classify European chemical companies by Standard Industrial Classification numbers.

Silicone Rubbers

A recent review carried out by Midland Silicones Ltd. of its principal grades of silicone rubber shows that, of the grades which account for about 90% of the total sales, nearly two-thirds have been developed by the company's own technologists at their laboratories during the last five years. These rubbers include general purpose grades such as the Silastomer 2452-2455 series, low compression set grades like the Silastomer 2472-2475 series, and the development products in the 2461-2465 series, which are extreme low temperature grades meeting Class M of DTD 818.

New and established grades are described in a booklet entitled 'Silastomer and Other MS Silicone Rubbers — a summary of the most important grades'. Copies can be obtained from the company at 68 Knightsbridge, London, S.W.1.

Protective Clothing

A de luxe yellow nylon/neoprene work suit that weighs only half as much as conventional suits, yet is claimed to be four times stronger, is featured in a new data sheet on protective clothing just released by B. F. Goodrich Industrial Products Co., Akron, Ohio.

The data sheet also illustrates and describes Koroseal and rubber work suits, industrial raincoats, the Hycar storm suit, Koroseal police raincoat and fleece-lined fire coat.

Silicones Leaflet

In preparation for the RECMF Exhibition next month, Midland Silicones Ltd. is sending 5,000 copies of a leaflet to companies in the electronic industry. This will be the first of five similar pamphlets, each dealing with different types of silicone used in electronic equipment. The first one is concerned with silicone glass laminates and cold cure elastomers, and copies can be obtained from Midland Silicones Ltd., 68 Knightsbridge, S.W.1.

Material Prices

Prices of materials appear regularly in RUBBER AND PLASTICS WEEKLY each month. It will be appreciated if suppliers will give notification of any price changes and additions to or deletions from their range. Comments on the present materials and classifications are invited in order that the list may be made of maximum service to our readers.

Unless otherwise stated prices are per lb. In most cases prices vary according to quantity. pc—per cwt pg—per gallon pt—per ton ag—according to grade xs—ex-store xw—ex-wharf dp—duty paid sp—special prices for contracts del—delivered cp—carriage paid

Accelerators

Alpha	5s. 8d.—6s. 4d.
Ancap cp	2s. 10d.—3s. 8d.
Ancap Zinc Salt cp	3s. 2d.—4s. 2d.
Ancatax cp	3s. 9d.—4s. 6d.
Ancazate BU cp	6s. 3d.—6s. 9d.
Ancazate ET cp	5s.—6s. 4d.
Ancazate ME cp	6s. 2d.—7s.
Ancazate Q cp	6s. 1d.—6s. 4d.
Ancazate XX cp	5s. 1d.—5s. 9d.
Ancazide ET cp	5s. 9d.—6s. 6d.
Ancazide IS cp	7s. 6d.—8s. 6d.
Ancazide ME cp	4s. 6d.—5s.
Cu.D.D.	9s. 3d.—10s.
D.Bu.D.	10s. 6s.—11s. 3d.
D.D.D.	12s. 2d.—13s. 3d.
D.P.G. cp	3s. 5d.—4s. 2d.
D.O.T.G. cp	4s. 5½d.—4s. 9d.
Dibenzo GMF	27s.—28s. 6d.
Furbac cp	5s.—5s. 9d.
Gamma	10s. 6d.—11s. 3d.
GMF	27s.—28s. 6d.
L.M.D.	9s. 3d.—10s.
M.Z.I.	3s. 6d.—4s. 2d.
N.Bu.D.	10s. 6d.—11s. 3d.
Ni.P.D.	12s. 2d.—13s. 3d.
P.P.D.	12s. 2d.—13s. 3d.
P.T.D.	12s. 2d.—13s. 3d.
Robac 22	10s.—11s. 3d.
Robac 44	9s. 1d.—9s. 10d.
S.P.D.	9s. 3d.—10s.
Suparac M	9s. 7d.
T.B.U.T.	15s.—16s.
T.E.T.	6s. 6d.—7s. 4d.
Thiuram P.25	15s.—16s.
T.M.S.	7s. 8d.—8s. 6d.
T.M.T.	5s. 4d.—6s. 3d.
Vulcacit CZ deldp	7s. 1d.
Vulcacit F deldp	4s. 8½d.
Vulcacit NP deldp	11s. 2d.
Vulcacit P Extra N deldp	8s. 1d.
Z.B.E.D.	15s.—16s.
Z.Bu.D.	6s. 3d.—7s. 3d.
Z.D.C.	5s. 1d.—5s. 7d.
Z.L.	9s. 3d.—10s.
Z.P.D.	9s. 3d.—10s.

Antioxidants and Antiozonants

Agerite AK cp	3s. 6½d.—4s. 5½d.
Agerite HPX cp	4s. 5d.—4s. 10d.
Agerite Powder cp	3s. 7d.—4s.
Agerite White cp	8s. 10d.—9s. 7d.
Antioxidant 2246 cp	11s. 8d.—12s. 4d.
Antioxidant 425 cp	18s. 6d.—19s. 3d.
Antioxidant SP cp	3s. 8d.—5s.
BLE-25	3s. 7d.—4s. 5d.
BXA	3s. 6½d.—4s. 5½d.
Naugawhite	4s. 9d.—5s. 6d.
Octamine	3s. 9d.—4s. 6d.
Polygard	3s. 7½d.—4s. 5d.
UOP 88 xs	9s. 3d.
UOP 288 xs	9s. 3d.
Wing-Stay S	3s. 8d.—4s.
Wing-Stay T	4s. 10d.—5s. 6d.
Wing-Stay 100	10s. 6d.—11s. 6d.

Compounding Ingredients

Barytes ptag	£10—£40
Calcium Silicate del	9d.—10½d.
Calcene ptxw	£52—£69 10s.
Carbonate, Light Mg. ptsp	£97
Carbonate, Actidated Ca. pt	£28—£30

Carbon Blacks:

Conductex SCF	1s. 2½d.
Continental AMPC ag	11½d.—1s. 4½d.
Continex FEF ag	9½d.—10½d.
Continex HAF ag	10½d.—11d.
Continex HMF ag	9½d.—9½d.
Continex ISAF ag	1s. 0½d.—1s. 0½d.
Continex SRF, SRF-NS ag	8½d.—9d.
Dixie 45 GPF xs	6½d.—7½d.
Dixie 60 HAF xs	7½d.—8½d.
Dixie 70 ISAF xs	9½d.—10½d.
Dixiedensed HM MPC xs	11½d.
Dixiedensed 77 EPC xs	11½d.
Furnex SRF	9d.
Kosmos 45 GPF	6½d.—7½d.
Kosmos 60 HAF	7½d.—8½d.
Kosmos 70 ISAF	9½d.—10½d.
Magecol 888 cp	7.60d.
Micronex MPC	11½d.
Micronex W6 EPC	11½d.
Philblack A. FEF	7d.—8d.
Philblack E. SAF	1s. 0½d.—1s. 1d.
Philblack G. GPF	6½d.—7½d.
Philblack I. ISAF	9½d.—10½d.
Philblack O HAF	7½d.—8½d.
Regal 300	7½d.—8d.
Regal 600	9½d.—10d.
Statex B. FF	10½d.
Statex R. HAF	11d.
Statex 93 HMF	9½d.
Sterling SO FEF	7d.—7½d.
Sterling V. GPF	6½d.—7d.
Ukarb 327 GPF xs	6½d.—7½d.
Ukarb 340 xs	7½d.—8½d.
Vulcan 6 ISAF	9½d.—10d.
Vulcan C CF	11d.—11½d.
Vulcan 3 HAF	7½d.—8d.
Vulcan XXX SCF	1s. 2½d.—1s. 2½d.
China Clay ptagxs	£12—£68 10s.
Factice Dark cp	1s. 0½d.—1s. 7d.
Factice Whitbro cp	1s. 3½d.—1s. 11d.
Factice White	1s. 4½d.—1s. 8½d.
Kieselguhr Spanish White ptxs	£37 12s. 6d.
Lithopone 30% ptxs	£68 10s.
Manosil VN3 pt	£120 5s.—£150 5s.
Micafine Powdered Mica ptxs	£67 10s.
Ochre Yellow pcxs	£1 19s.
Oxide Light Mg ptsp	£245
Oxide Red pcxs	£4 3s.
Oxide Titanium 98% pcxs	£8 8s
Rutiox CR pcxs	£9 3s
Rubber Gen. Gran. Mineral ptxs	£35 5s.
Shellac Dewaxed xs	1s. 9d.—2s. 3d.
Shellac Orange xs	2s.—3s. 9d.
Silica Hydrated ptxs	£113
Sulphur Manox Insoluble del	1s. 9d.
Sulphur Powdered ptdel	£20 17s.
Sulphur Sublimed Flowers ptxs	£52 10s.
Talc Norwegian ptxs	£13 7s. 6d.
Talc Italian ptxs	£30 2s. 6d.
Tufknit Durham CS	8½d.—10½d.
White Lead Dry ptdelsp	£114 15s.
Whitetex 2 Clay ptxs	£45 10s.
Whiting ptxs	£5 9s. 6d.—£7 7s. 6d.
Zinc Oxide pcdel	£6

Plasticizers and Softeners

Abalyn pc	220s.—271s.
Al Stearate ptxwdp	£253 10s.
Bisoflex 102 pt	£513—£568
Butyl Ricinoleate	2s. 6d.—2s. 6½d.
But. Ac Ricinoleate	3s. 0½d.—3s. 1½d.
Butyl Stearate pt	£277—£282
Ca. Stearate ptcp	£220
Diallyl Phthalate	3s. 11d.—4s. 11½d.
Dialkyl Phthalate pt	£221—£222
Dibutyl Phthalate pt	£203—£204
Dibutyl Sebacate	5s. 9½d.
DiOA pt	£354—£357
DiOS sp	5s. 0½d.—5s. 2d.
DOA pt	£414—£420
DOP pt	£276—£277
DOS sp	5s. 7½d.—5s. 9d.
Disobutyl Phthalate pt	£196—£197
Diisooctyl Phthalate pt	£221—£222
Dinonyl Phthalate pt	£211—£212
DNS sp	5s. 2½d.—5s. 4½d.
Ester Gum pcag	130s.—150s.
Flexol 3GO	4s. 8d.
Hercolyn pc	242s.—294s.
Lankroflex ED3	3s. 2d.—3s. 2½d.
Lankroflex 29 pt	£216—£217
Lead Stearate ptxwdp	£223 10s.
Methyl Ricinoleate	2s. 4d.—2s. 4½d.
Me. Ac Ricinoleate	2s. 11½d.—3s. 0½d.
Polyglycol Oleate 400 pt	£285
Reomol D79A pt	£354—£357
Reomol D79S sp	5s. 0½d.—5s. 2d.
Reoplex 100 sp	6s. 1½d.—6s. 2½d.
Reoplex 110 sp	5s. 10d.—6s. 5½d.
Reoplex 220 sp	5s. 6½d.—5s. 8d.
Reoplex 300 sp	7s. 2d.—7s. 3½d.
Reoplex 400 sp	4s. 2½d.—4s. 4d.
Rosin Oil pgag	8s.—18s.
Triphenyl Phosphate pt	£366
Tricresyl Phosphate pt	£233
Trixylyl Phosphate pt	£200
Zinc Stearate ptdel	£220—£230

Solvents and General Chemicals

Acetic acid ptdel	£77—£100
Acetic Anhydride ptdel	£128
Acetone ptdel	£75—£120
Alcohol:	
Absolute 74.5 op pgdel	4s. 0½d.—4s. 4½d.
Butyl pt	£132—£193 10s.
sec-Butyl ptdel	£128—£168
Ter-Butyl ptdel	£172—£195
Isopropyl Tech. 99% pgdel	5s.—6s. 5½d.
Butyl 'Carbitol' pt	£283
Butyl Acetate pt	£159—£217
Caprylic Acid ptdel	£395
Carbon Bisulphide ptxs	£71 10s.
Carbon Tetrachloride pg	12s. 4d.—20s.
'Cellosolve' Acetate pt	£250
Cresol m- 98% del	4s. 9d.
Cresol o- 30/31°C. del	1s.
Cresol p- 34/35°C. del	5s.
Ethyl Acetate pt	£131—£189
Formaldehyde ptdel	£40
Glycol:	
Diethylene pt	£158
Ethylene pt	£132
Polyethylene 200 pt	£214
,, 300 pt	£214
,, 400 pt	£214
,, 1,500 pt	£264
,, 4,000 pt	£274
,, 6,000 pt	£294
Isopropyl Acetate pt	£126—£184
Isobutyl Acetate 80% pt	£126—£185
Lauric Acid ptdel	£273
M.E.K. ptdel	£134 10s.—£143 10s.
M.I.B.K. ptdel	£166—£209
Methylated Spirits pgdel:	
Industrial 61op	5s. 5½d.—7s. 2d.
,, 74 op	6s. 3d.—7s. 11½d.
'Q' grade 68 op	8s. 5½d.—10s. 5d.
Pyridinised 66 op	5s. 10d.—7s. 6½d.
Denatured Methanol	3s. 9½d.—4s. 10d.
Monoethanolamine pt	£252
Naphtha Coal tar pg:	
Heavy 90—190	4s.
Light 90—160	5s. 1d.
Palmitic Acid ptdel	£147
Phenol pldel	1s. 4d.—1s. 7d.
Pyridine pg	16s. 6d.
Stearine ptag	£108—£130
Toluol Pure/Nitration pg	5s. 8d.
Toluol 90's pg	5s.
Triethanolamine pt	£224
Xylol 2/30 pg	5s. 9d.

NEW COMPANIES

Croydon Asbestos Co. Ltd. (691,418). May 2. Capital: £9,000 in £1 shares. To carry on the business of manufacturers of, and dealers in, all forms of protective clothing, and manufacturers in asbestos, leather, rubber, twill, cotton, pvc, etc. The directors are: James F. Knowles, The Rowans, Butlers Dene Road, Woldingham, Surrey; Herbert Hinchliffe, 10 Fir Tree Gardens, Shirley, Croydon, Surrey. Regd. office: 214 Sydenham Road, Croydon, Surrey.

General Adhesive Co. Ltd. (691,373). May 2. Capital: £100 in £1 shares. To carry on the business of manufacturers of, and dealers in, natural and synthetic adhesive compositions and surface coatings, plastics compositions, and fabricated and moulded plastics and rubber products, etc. The directors are: Samuel R. Middlehurst, 160 Grimshaw Lane, Middleton, Lancs.; Margaret Pendlebury, 168 Derby Road, Salford, 6. Regd. office: 916 Manchester Road, Castleton, Rochdale.

Plastic Containers Ltd. (691,190). May 1. Capital: £100 in £1 shares. To carry on the business of manufacturers, wholesalers, retailers and distributors of plastics bottles and containers, etc. The first directors are: Robert E. Lynam, 43 Woodside, Petts Wood, Kent; Shimon Majaro, 3 Kerry Avenue, Stanmore. Regd. office: 1 Avery Row, W.1.

J. O. Youngman (Tyres) Ltd. (691,510). May 3. Capital: £5,000 in £1 shares. To carry on the business of manufacturers of, and dealers in, tyres, etc. James O. Youngman, Gissings Farm, Fressingfield, Suffolk, is the first director.

Hadleys Tyre Depot Ltd. (691,029). April 28. Capital: £1,000 in £1 shares. To carry on the business of manufacturers of, and dealers in, tyres, etc. The permanent directors are: George Hadley, Herbert C. Hadley and Lucy Hadley, all of 129 Newbury Lane, Oldbury, Worcs.; Lawrence G. Hadley, Elhanan, Himley Road, Gornal Wood, Dudley. Regd. office: 129 Newbury Lane, Oldbury, Worcs.

Plastics (Fareham) Ltd. (691,053). April 28. Capital: £100 in £1 shares. To carry on the business of manufacturers, exporters and importers of, and dealers in, fibre glass products, bicycles, tricycles, motor cycles and cars, electrical fittings, wireless and television sets, etc. The directors are: Arthur C. Faulkner, 44 Hill Park Road, Fareham; Ronald J. T. Mingay, 14 Colenso Road, Fareham, Hants. Regd. office: Broad Cut, Wallington, Fareham, Hants.

Tyre Services (Yeovil) Ltd. (692,018). May 8. Capital: £200 in £1 shares. The directors are: Douglas Seaton and Dorothy M. Seaton, both of The Hall, West Coker, Somerset; James D. Thompson, 61 Preston Road, Yeovil. Regd. office: Penn Mill Trading Estate, Yeovil, Somerset.

Postal Plastics Ltd. (692,091). May 8. Capital: £1,000 in £1 shares. To carry on the business of manufacturers of and distributors, by mail order or otherwise, of plastics, synthetic and natural articles of all kinds, etc. The directors are to be appointed by the subscribers. Regd. office: 47 Long Acre, W.C.2.

United Reclaim Ltd. (692,019). May 8. Capital: £100 in £1 shares. To acquire patents relating to processes for the treatment of ground vulcanized scrap rubber tyres and waste rubber in reclaiming rubber for manufacturing purposes and other uses, etc. The first directors are to be appointed by the subscribers.

Robson and Mackie Ltd. (692,096). May 8. Capital: £100 in £1 shares. To carry on the business of precision engineers and consultants in engineering and plastics, etc. Regd. office: 18 Harcourt House, 19 Cavendish Square, W.1.

Technical Resin Bonders Ltd. (692,719). May 15. Capital: £1,000 in £1 shares. To carry on the business of dealers in synthetic resins, light sensitive resins, acid-resisting coatings, thermoplastic and other coatings; manufacturers of, and dealers in, bonding and veneering metals, plastics, etc. The directors are: George S. Newell and Mrs. Kathleen Newell, both of 24 Wingate Way, Trumpington, Cambs. Regd. office: The Lane, Hauxton, Cambs.

CLASSIFIED ADVERTISEMENTS

RUBBER AND PLASTICS WEEKLY

Classified Advertisers please note we shall be closing for press a day earlier than usual for our **June 17th** INTERPLAS EXHIBITION ISSUE.

Instructions must be received by 11.15 a.m. Tuesday June 13.

APPOINTMENTS VACANT

6d. a word, Minimum 12/6 Box 2/-

APPLICATIONS are invited for the position—foreman, extrusion department of a rubber company in Surrey. Pension and bonus schemes in operation.—Write in confidence, giving full details of age, experience and present salary to Box 1088. (1088)

NATIONAL COLLEGE OF RUBBER TECHNOLOGY
Holloway, London, N.7.

The Board of Governors invites immediate applications for appointment as LECTURER IN POLYMER TECHNOLOGY. Applicants should hold a degree or equivalent qualification and have had works experience in the technology of plastics and rubbers. Salary scale—£1,421 x £35 x £1,561 x £40 x £1,601.

Apply for form of application and further particulars.

R. H. CURRELL, F.C.A.
Clerk.

(1094)

APPOINTMENTS VACANT (continued)

CHANCE of a lifetime for a keen, energetic executive with administrative qualifications and experience and contacts in rubber and plastics. There is an opening to take charge of the Manchester office of a well known supply company. Generous salary and bonuses.—Reply in confidence Box 1090. (1090)

VACANCY for young rubber technologist with initiative and some experience in footwear. Salary according to experience. South London.—Box 1085. (1085)

APPOINTMENTS WANTED

6d. a word, Minimum 10/- Box 2/-

GRADUATE with extensive experience of sponge and cellular rubber, mechanicals and floorings, seeks a change where this experience can be fully employed.—Box 1099. (1099)

WORKS manager, rubber/plastics, requires similar position, Surrey, Kent, Sussex area. Fully conversant all aspects of production, development, tool design and manufacture, planning, cost control, installation of plant, good organiser.—Box 1073.

This column can be YOUR best BUYER or SELLER

RUBBER & PLASTICS

MACHINERY

Why not see for YOURSELF

MACHINERY FOR SALE

6d. a word, Minimum 12/6 Box 2/-

BRIDGE 60in. x 22in. mill with 100 h.p. drive. 30in. x 24in. and 21in. single geared cracker with 200 h.p. drive. 8½in. Royle extruder with 120/40 h.p. drive. Shaw 48in. x 18in. 3-bowl calender with 30/15 h.p. drive. Pair of 50in. x 18in. single geared mills by Robinson with 140 h.p. drive, through Moss double helical gearbox. 42in. x 16in. single geared mill by Power Plant with 50 h.p. drive.—Reed Brothers (Engineering) Ltd. (Receiver and Manager—Mr. C. E. M. Hardie), Woolwich Industrial Estate, London, S.E.18. Tel. Woolwich 7611.

(1095)

MACHINERY FOR SALE

(continued)

CLECO Battery Electric Reach Type Forklift Truck. Manufactured 1957. 2,000-lbs. capacity. 6ft. lift. Travelling gallows type. Also fitted with hydraulic side shift and hydraulic fork width adjustment. Compact and highly manoeuvrable. This has been in operation less than 6 months from new and is in magnificent condition throughout. Complete with battery charging unit. £950. Photograph available.—Speed Electrics Dept. R.J., Church Street, Basford, Nottingham. Tel. 75716. (1100)

MANUFACTURERS of roughing machines for rubber sheeting, sponge rubber, splitting machines, leather cloth plant, embossing plates and rollers, spreading machines and presses.—G. L. Murphy Ltd., Imperial Works, Menston, Nr. Leeds. (238R)

PLASTIC injection moulding machine, Windsor 6oz. model SH6. Steam boilers, 200lbs. to 16,000lbs. evaporation; Economic, Cochran, Lancashire; automatic oil and stoker firing; delivery and installation anywhere. Insurance approved and 12 months' guarantee. Highest part exchange valuations.—Fred Watkins (Enginering) Ltd., Coleford, Glos. Telephone: Coleford 2271 (5 lines). (1023)

2 IDDON 2in. rubber extruders, 7½ h.p. Variable speed drive. In good condition.—Box 1096. (1096)

Donald Leaver Limited

1 LONDON ROAD, STAINES, MIDDX. Phone STAINES 55271-2

FOR **SECONDHAND PLANT AND MACHINERY** (1057)

TECHNICAL COURSES

National College of Rubber Technology

HOLLOWAY ROAD, LONDON, N.7

The College is financed by the Ministry of Education and supported by Industry. The courses offered include:—

Associateship of the College (A.N.C.R.T.) and of the Institution of the Rubber Industry (A.I.R.I.)

Three-year full-time course in rubber technology. Qualification for entry—G.C.E. with at least two of the subjects chemistry, physics and mathematics at Advanced Level and the third studied to that level.

Sandwich Course for A.N.C.R.T. and A.I.R.I.

Four-year course for employees of firms in the rubber industry prepared to send them to the College for approximately six months (two terms) of each year. College directs students' reading whilst at factory. Qualifications for entry as above: or L.I.R.I.; or good National Certificate in Chemistry with adequate physics and mathematics. Candidates not yet employed may send particulars to the College for transmission to possible employers.

'COLLIND' Industrial Collaboration Course for A.N.C.R.T. and A.I.R.I.

Five-year course for employees of firms in the rubber industry who prefer students to participate in the normal full-time course with 14 months in industry between the first and second, and second and third, academic years in College. Qualifications for entry as above. Employers can maintain continuity of personnel in the factory by employing two men and seconding them to the College during alternate years.

Post-Graduate Courses leading to A.I.R.I. and A.P.I.

One-year full-time course in either rubber or plastics available to those holding degrees in chemistry or physics.

A.P.I.

Three-year full-time course leading to the examinations for Graduateship and Associateship of the Plastics Institute. Qualifications substantially as for three-year rubber course.

L.I.R.I.

One-year intensive full-time course, or two-year sandwich course, for those at G.C.E. Ordinary Level wishing to qualify for a position of subordinate responsibility in the rubber industry. Success in this course may qualify for admission to the A.I.R.I. course.

Research Courses

Suitably qualified polymer technologists are accepted for specialised courses leading to Fellowship of the National College (F.N.C.R.T.) and higher degrees by research.

Prospectus, giving details of available scholarships and all full-time, part-time and evening courses, free on application. (972)

MACHINERY WANTED

6d. a word, Minimum 12/6 Box 2/-

BIAS cutter suitable for unvulcanised rubberised canvas.—Box 1097. (1097)

100/200 tons hydraulic gooseneck press. Two daylights each 4in., platen size 22in. long x 18in., steam heated to 295°F with water-cooled ends to 90°F.—Reply to reference P.2, T.B.A. Company Limited, P.O. Box 40, Rochdale. (1098)

TRADE SERVICES

6d. a word, Minimum 12/6 Box 2/-

SCISSORS, up to 7in. ground and set by London cutlers established over 100 years; 48 hours postal service, 1/6 per pair.—J. A. Fowler, 18/22 Bell Street, Edgware Road, London, N.W.1. PAD 1491. (74R)

BUSINESS PROPOSITIONS

As a result of recent plant extensions

THE RUBBER REGENERATING CO. LTD.

Trafford Park, Manchester 17

has surplus capacity in its Dispersions Department and invites any enquiries from interested Companies. In particular we have available an

ULTRASONIC HOMOGENISER

capable of producing polymer or other emulsions at a rate of about ½ ton per hour. Fullest assistance by an experienced technologist supported by laboratory facilities will be given if required.

Please write or telephone in the first instance for the attention of:—

THE COMMERCIAL DEVELOPMENT MANAGER, TRAFFORD PARK 1424

(1087)

ARTICLES WANTED

PVC *Sheeting scrap all types colour sorted and mixed regular quantities available*

MICHAEL S. STEVENS LIMITED

Station Works, 75c Upper Richmond Road, Putney, S.W.15

VANDYKE 6925 (739)

ADVERTISERS

YOUR ANNOUNCEMENTS MAY BE DISPLAYED IN THE CLASSIFIED SECTION AT THE FOLLOWING RATES

PER INCH SINGLE COLUMN

1 INSERTION £3. 0. 0. 7 INSERTIONS £2. 15. 0. EACH

13 INSERTIONS OR MORE £2. 10. 0. EACH

OR AS LINES AT 5s. 6d. PER LINE

PLANTATION RUBBER

* * *

RUBBER LATEX

* * *

All grades

For samples and prices please write to :

HILTON, WALLACE & CO. LTD

St. Dunstan's House

IDOL LANE, LONDON, E.C.3

Telephone : MANsion House 1005

Exclusive Compounds

NATURAL or SYNTHETIC for particular purposes

e.g. Tank Lining
Precision Mouldings
Gaskets and Jointings
Butyl Neoprene and Hypalon applications

Enquire

HATCHAM RUBBER
COMPANY LIMITED

PRINCES WAY, WADDON, CROYDON, SURREY
CROydon 6054/56

SULPHUR from LACQ

BRIGHT AND GROUND SULPHUR

Enquiries

Either to :

K. W. CHEMICALS LIMITED
CAROLINE HOUSE,
55/57 HIGH HOLBORN,
LONDON, W.C.1.
Tel: CHAncery 7981/7

or to :

WILLIAM BLYTHE & Co. Ltd.
HOLLAND BANK WORKS,
CHURCH, ACCRINGTON,
LANCASHIRE.
Tel: ACCrington 32141

LABORATORY

MIXING MILL

WITH INSTANTLY VARIABLE ROLLER FRICTION RATIOS

nfinitely variable roller speeds obtainable by simple adjustment of handwheel. Heated or cooled rollers combine to meet laboratory demands. Full details of this and rubber factory equipment on request.

Planters

PLANTERS ENGINEERING CO. LTD.

109, Uxbridge Road, Ealing, London, W.5 Phone: EALing 6062/3

(Associated with ENTWISLE & GASS LTD.)

INDEX to ADVERTISERS

	Page
Abrasive Developments Ltd.	—
A.E.W. Ltd.	—
Allcock, J., & Sons Ltd.	vi
Amalgamated Oxides (1939) Ltd.	—
Anchor Chemical Co. Ltd.	viii
Anderson, Joseph, & Sons Ltd.	v
Armour Hess Chemicals Ltd.	—
Ashley Associates Ltd.	—
Associated-Rediffusion Ltd.	—
Astor Boisselier & Lawrence Ltd.	—
Baker Perkins Ltd.	—
Barfoot, T. W., & Webb, W. F.	—
Barwell Engineering Ltd.	—
Belgrave Industries (Exports) Ltd.	—
B.I.P. Chemicals Ltd.	—
Birch, Singleton, W., & Sons Ltd.	—
Boston Marine & General Eng. Co. Ltd.	—
Bridge, David, & Co. Ltd.	860
Bright, John, & Bros. Ltd.	—
British Electrical Development Association	875
British Geon Ltd.	—
British Nylon Spinners Ltd.	—
British Recovered Rubber Co. Ltd.	—
British Resin Products Ltd.	—
British Titan Products Co. Ltd.	—
British Transport Commission	—
Bush Beach & Segner Bayley Ltd.	—
Cabot Carbon Ltd.	873
Carter Bros. (Rochdale) Ltd.	—
Carlton Press Knives Ltd.	—
Chance & Hunt	—
C.I.C. Engineering Ltd.	—
Cleggswood Oil Distillery Ltd.	—
Cohen, George, Sons & Co. Ltd.	—
Columbian International (Gt. Britain) Ltd.	—
Consolidated Zinc Corporation (Sales) Ltd.	—
Corrosion Exhibition	—
Crosfield, Joseph, & Sons Ltd.	—
Croxton & Garry Ltd.	894
Derrick Davis Plastics Ltd.	—
Dietzel, Hugo	—
Distillers Co. Ltd., The	—
Dixon, T. H., & Co. Ltd.	—
Docker, John, & Co. (Engs.) Ltd.	859
Dunlop Rubber Co. Ltd.	882, 883
Du Pont Co. (United Kingdom) Ltd.	—
Durham Raw Materials Ltd.	—
Economist Intelligence Unit Ltd., The	—
Ellison, George, Ltd.	—
English Clays Lovering Pochin & Co. Ltd.	—
English Electric Co. Ltd., The	—
Esso	—
eur-O-matic	—
Fawcett Preston & Co. Ltd.	—
Ferguson, A. O., & Co. Ltd.	—
Ferguson, James, & Sons Ltd.	—
Ferguson Shiers Ltd.	—
Firestone Tyre & Rubber Co. Ltd.	—
Foamair Ltd.	—
Geigy Company Ltd., The	—
Goodyear Tyre & Rubber Co. Ltd.	—
Greeff, R. W., & Co. Ltd.	—
Gresham & Craven Ltd.	—
Gummi und Asbest	—
H. F. Industrial Services Ltd.	—
H. K. Import & Export Ltd.	—
Halsteads Engineers (Leyland) Ltd.	—
Hankin, Geo., & Co. Ltd.	—
Hardman & Holden Ltd.	—
Hatcham Rubber Co. Ltd.	893
Hay & Robertson Ltd.	879
Hilton, Wallace, & Co. Ltd.	893
Hubron Rubber Chemicals Ltd.	Cover iv
Hughes & Hughes Ltd.	—
Hunt Heat Exchangers Ltd.	—
Iddon Bros. Ltd.	iv
Iliffe Industrial Publications Ltd.	—
Imperial Chemical Industries Ltd. (Billingham)	—
Imperial Chemical Industries Ltd. (Dyestuffs)	868, 869
Imperial Chemical Industries Ltd. (Plastics—Maranyl)	—
Imperial Chemical Industries Ltd. (Terylene)	—
Institution of the Rubber Industry	—
International Corporation Ltd.	—
International Synthetic Rubber Co. Ltd.	Cover i
Ioco Ltd.	—
K. W. Chemicals	893
Kautschuk und Gummi	—
Kendell, T., & Sons Ltd.	—
Ketjen Carbon	—
Lankro Chemicals Ltd.	—
Laporte Titanium Ltd.	—
Latex Engineering Co.	—
Lavino (London) Ltd.	—
Leaver, Donald, Ltd.	—
Leeds & Bradford Boiler Co. Ltd., The	—
Lindsay & Williams Ltd.	—
Lonabarc Ltd.	—
Londex Ltd.	—
London & Scandinavian	—
Lord, R., & Sons Ltd.	—
McKechnie Bros. Ltd.	—
Maclaine, Watson & Co. Ltd.	—
Mersey White Lead Co. Ltd., The	—
Metal Box Co.	—
Micafine Ltd.	—
Monsanto Chemicals Ltd.	—
Muehlstein, H., & Co. (London) Ltd.	886
Muller, Max	—
Natural Rubber Bureau	—
Nederlandsch Verkoopkantoor Voor Chemische Producten N.V.	—
New Conveyor Co. Ltd.	—
Noble Lowndes Pension Service, The	—
Northwestern Rubber Co. Ltd.	—
Novadel Ltd.	—
Oswald & Duncan Ltd.	—
Philblack Ltd.	—
Phoenix Rubber Co. Ltd.	—
PLA—MA Ltd.	—
Planters Engineering Co. Ltd.	893
Polymer (United Kingdom) Ltd.	—
Preston Tyre Fabric Manufacturing Co. Ltd.	—
Price's (Bromborough) Ltd.	—
Pullen, James H., (1942) Ltd.	vi
Quick-Wrap Tubing Co. Ltd.	—
Rubber Estate Agency Ltd.	—
Reed Bros. (Eng.) Ltd.	—
Revue Generale du Caoutchouc	—
Rhein-Chemie GmbH.	—
Robinson Bros. Ltd.	—
Robinson, Joseph, & Co. Ltd.	888
Rotunda Ltd.	—
Rubber Age (New York) Ltd.	—
Rubber Growers Association	—
Rubber Latex Ltd.	888
Rubber Regenerating Co. Ltd., The	Cover ii
Scott Bader & Co. Ltd.	—
Sealants Ltd.	—
Shaw, Francis, & Co. Ltd.	ii
Shell International Chemical Co. Ltd.	865
Shell Mex & BP Ltd.	—
Smith, Alfred, Ltd.	—
Smith, Wilfrid, Ltd.	—
Squire, Frederick, Ltd.	—
Stechler, L., & Co. Ltd.	—
Steel, J. M., & Co. Ltd.	—
Steele & Cowlishaw Ltd.	—
Stocker, W. B., & Co. Ltd.	—
Storeys of Lancaster	—
Stott, James, Ltd.	i
Sturge, John & E., Ltd.	—
Sutcliffe Engineering Components Ltd.	—
Sutcliffe Speakman & Co. Ltd.	—
Tanner Bros. (Greenfield) Ltd.	—
Tilghman's Ltd.	—
Union Carbide Ltd.	—
United Norit Sales Corporation Ltd.	—
United Wire Works Ltd., The	—
Universal Oil Co. Ltd.	—
Universal Oil Products Co.	—
Vacu-Blast Ltd.	—
Verson Engineering Co. Ltd.	—
Wallace, H. W., & Co. Ltd.	—
Wallis Engineering Co.	—
Washington Chemicals	vii
Welwyn Tool Co. Ltd.	—
Whiffen & Sons Ltd.	iii
Witco Chemical Co. Ltd	886
Zama Ltd.	—

FOR VITAL INFORMATION ON OMYA

CROXTON & GARRY LTD.,
27 St. James Road,
Kingston-on-Thames, Surrey.
Telephone: KINgston 9444 (P.B.X.)

STAND No. B.220

Also at Glasgow and Manchester

inter plas
21 JUNE - 1 JULY 1961
see our exhibit
OLYMPIA — LONDON

for the bookshelf—

SELECTED TITLES FOR ALL CONCERNED WITH RUBBER AND PLASTICS

BOOKS

ENGINEERING DESIGN with RUBBER

The first theoretical examination of an increasingly important subject to appear in book form, this work has also been designed to be a practical manual for engineers and rubber technologists faced with problems in rubber engineering design.

50/- By Post 2/- extra

A. R. PAYNE, B.Sc., A.Inst.P., F.I.R.I., and J. R. SCOTT, Ph.D., M.Sc., F.R.I.C., F.Inst.P., F.I.R.I., Rubber and Plastics Research Association of Great Britain.

SYNTHETIC RUBBER TECHNOLOGY

Written to meet the need of rubber technologists primarily concerned with the compounding and processing of synthetic elastomers, this book is entirely practical in its approach to the subject. The elastomers considered are: SBR, High Styrene Resins, Butyl Rubber, Neoprene, Nitrile Rubber, Silicone Rubber, and Thiokol. A textbook and handbook to the Synthetic Rubber Industry.

50/- By Post 2/- extra

Vol. I—Compounding, Processing and application of Standard Types
W. S. PENN, B.Sc.

The ANALYSIS of RUBBER and RUBBER-LIKE POLYMERS

The first modern work devoted solely to this important subject to be published in the English language. In addition to the analysis of natural and synthetic rubbers, the author deals with rubber-like plastics such as Polyethylene, PVC, PVDC, PVA and Polyurethanes. It has become a standard work and is a "must" for all analysts interested in this subject.

50/- By Post 2/- extra

WILLIAM C. WAKE, M.Sc., Ph.D.(Lond.), F.R.I C., F.I.R.I., Rubber and Plastics Research Association of Great Britain.

CONDUCTIVE RUBBER

For the research worker and the technologist this book provides a comprehensive outline of the knowledge which exists on the "conductive" or "antistatic" classes of rubber. (*Second impression.*)

20/- By Post 1/6 extra

R. H. NORMAN, M.Sc., A.Inst.P., A.I.R.I., Rubber and Plastics Research Association of Gt. Britain

PROSPECTUSES CAN BE HAD ON REQUEST

Obtainable from :

RUBBER AND PLASTICS WEEKLY

BOOK DEPARTMENT

131 Great Suffolk Street, London, S.E.1

Telephone : HOP 5712

The FIRST British produced

RE-INFORCING FURNACE BLACKS 327 and 340

★ HIGH EXTRUSION RATE
★ LOW SCORCH TENDENCY
★ BETTER AGEING PROPERTIES

OKARB

SAMPLES AND FULL TECHNICAL DATA FROM SOLE DISTRIBUTORS

WILFRID SMITH LIMITED

ALBION STREET, FAILSWORTH, Near MANCHESTER
Telephone: FAILSWORTH 2691 (5 lines) *Telegrams:* 'HUBRONRUB'

16 PHILPOT LANE *Telephone:* MANSION HOUSE 2064
LONDON E.C.3 *Grams:* 'ACCOLLYST,' BILGATE, LONDON

Printed in Great Britain by F. J. PARSONS, Ltd., London and Hastings, and published by the Proprietors, MACLAREN & SONS, LTD., Maclaren House, 131 Great Suffolk Street, London, S.E.1